United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with Purdue University Agricultural Experiment Station and the State Soil Conservation Board, Division of Soil Conservation, Indiana Department of Natural Resources

Soil Survey of Newton County, Indiana

How To Use This Soil Survey

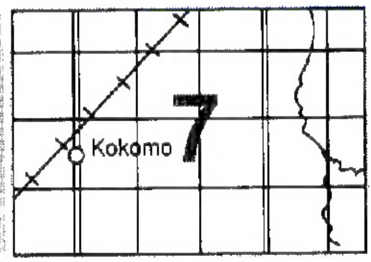
General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

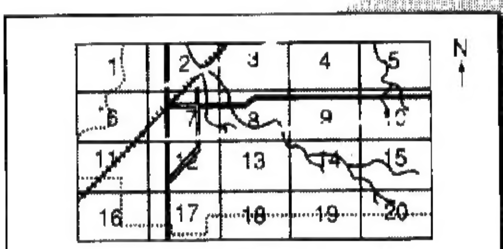
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.



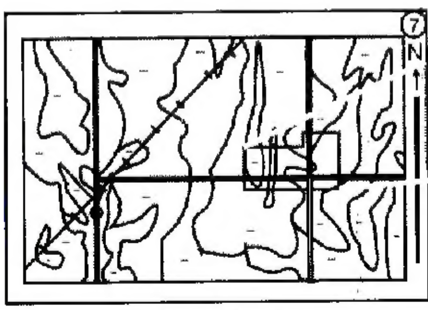
MAP SHEET

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.

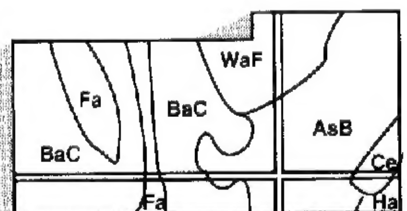


INDEX TO MAP SHEETS

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



MAP SHEET



AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1986. Soil names and descriptions were approved in 1988. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1988. This survey was made cooperatively by the Natural Resources Conservation Service, Purdue University Agricultural Experiment Station, and the State Soil Conservation Board, Division of Soil Conservation, Indiana Department of Natural Resources. The survey is part of the technical assistance furnished to the Newton County Soil and Water Conservation District. Financial assistance was provided by the Newton County Board of Commissioners.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

All programs and services of the Natural Resources Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: Soybeans in an area of Morocco loamy sand. The pine trees in the background are in an area of Oakville fine sand, 2 to 6 percent slopes.

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Issued 1998

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Foreword

This soil survey contains information that can be used in land-planning programs in Newton County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

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Soil Survey of Newton County, Indiana

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United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
Purdue University Agricultural Experiment Station and the State Soil Conservation Board, Division of Soil Conservation, Indiana Department of Natural Resources

NEWTON COUNTY is in the northwestern part of Indiana (fig. 1). It has a total area of 403 square miles, or 258,080 acres. At the widest points, the county is about 33 miles from north to south and 14 miles from west to east. Illinois borders the western edge of the county, and the Kankakee River forms the northern border.

Kentland, the largest city, is the county seat. In 1985, Newton County had an estimated population of 14,390 and Kentland had a population of 1,830.

Farming is the economic base of the county. The main farm enterprises are cash grain crops, specialty crops, and livestock. Urban expansion has increased in the northern part of the county.

The first soil survey of Newton County was published in 1955 (Rogers, 1955). The current survey updates this earlier survey and provides additional information. Also, it has larger maps, which show the soils in greater detail.

General Nature of the County

Joan Riegel, secretary, Newton County Soil and Water Conservation District, helped prepare this section.

This section provides general information about Newton County. It describes settlement, physiography, drainage and relief, natural resources, climate, water supply, transportation facilities, manufacturing and agricultural business services, and trends in population and land use.

Settlement

The original inhabitants of the survey area were Indians. The Pottawatomi did not have permanent homes but camped in the groves and on the knolls close to the Iroquois River. The river provided them with fish and fur throughout the year. The Sioux, Iroquois, and Kickapoo also made occasional visits to the area. They were attracted by the abundance of game, fish, and furbearing animals.

Early settlers arrived in Indiana between 1800 and 1816, but only a few pioneers settled in the area that is now Newton County.

With the signing of the Logansport Treaty in 1832, the United States government received from the Pottawatomi Indians the land that bordered lower Lake Michigan and reached about as far south as the Iroquois River. Newton County was part of this Northwest Territory. French rule dominated the area throughout the first quarter of the 18th century. The British ruled during the middle half of the century, and in the last quarter of the century the area fell under American rule.

In 1838, the 700 or so remaining Pottawatomi Indians

Figure 1.—Location of Newton County in Indiana.

were rounded up and forced westward to Kansas with members of other Indiana tribes in the infamous "Trail of Tears" (Alkire, 1978). Only a handful of Indians hid out and remained in the area.

The early pioneers did not tarry long in Newton County because there were no roads and the area contained little but tall prairie grasses and swamps (Rogers, 1955). Supplies had to be carried in on foot or on horseback. Most of the early settlements were made in or along the edges of wooded areas. Unlike the prairie grasslands, these wooded areas provided construction materials, fuel, and protection.

The first permanent settlements in Newton County were located along the Iroquois River, which was called Pickamick by the Indians, and along Beaver Creek. The early settlers established homes in the timbered areas and grew corn, wheat, and vegetables. They used the prairie areas as pastures for their cattle.

Subsequent settlement was slow until the end of the 19th century, mainly because much of the county was unfavorable for settlement. One unfavorable area was the great swamp in the northern part of the county. Much of this area was first settled by Dutch, Norwegian, and German immigrants. They began drainage of the great swampland in the 1850's. Newton County, however, was not effectively opened to agriculture until around the turn of the century, when the controversial Kankakee Ditch was completed.

The early settlers began draining the great swampland by using oxen to plow a ditch from one slough or marsh to the next. The task of ripping through the dense root system of the marsh grasses often required 30 yoke of oxen to pull a 30-inch plow for just one ditching outfit. The meandering system of drainage ditches is still evident today (Rogers, 1955).

In 1853, the first crude ditch was completed. This ditch drained about 8,000 acres of what was once the largest body of water in Indiana. The lake was more than 7 miles long and 5 miles wide. It covered more than 16,000 acres and ranged from 12 to 15 feet in depth (Rogers, 1955; Alkire, 1978). Along the southern shoreline, numerous arms and inlets backed into an area of low hills. The Indians called this body of water "Beaver Lake" because of the abundance of beaver in the area.

Another area unfavorable for settlement was the large prairie grassland that covered most of the southern part of the county. This area consisted of a luxuriant growth of native prairie grasses. Historical accounts of the county indicate that some of the grasses were tall enough to hide a rider on horseback. The area was unfavorable for settlement because it provided no natural protection, materials for fuel and home construction were not available, there was a constant hazard of prairie fires, and the heavy sod was difficult to plow.

Wagons cut new trails through the prairie and marsh grasses on their journey northwest from Terre Haute, Indiana, to Fort Dearborn, Illinois, which is now Chicago (Newton County Agricultural Stabilization and Conservation Service and others, 1977). Traveling through the prairie grasses was a serious undertaking. People frequently lost their way in sudden torrential rainstorms. In winter, blinding snow and ice storms were often a serious problem. Most travelers were concerned about the danger of being caught in a prairie grass fire. These fires were rapidly spread by high, unbroken winds and left behind a charred and blackened wasteland.

In the early 1850's a group of wealthy and aggressive men from New York and New England moved into the area. They became known as the

"Cattle Barons." These men secured large holdings in the prairie areas and used the grasslands as pasture for their cattle. They began the great task of clearing the prairie grasses so the areas could be farmed.

Tillage of the unprotected grasslands began in about 1859, after the invention of the steel plow by John Deere (Rogers, 1955).

In 1835, the State Legislature divided the northern part of Indiana into 14 different tracts, one of which was named "Newton." This tract included parts of what are now Lake, Porter, Jasper, and Newton Counties. The present boundaries of Newton County were established in 1859. Newton County was the 92nd and last county to be formed in Indiana.

In 1851, Morocco became the first town to be platted in Newton County. Kentland was established in 1860, Goodland in May of 1866, Brook in June of 1866, and Lake Village in 1876. Other towns in the county include Thayer, Roselawn, Julian, Foresman, Beaver City, Ade, Enos, Conrad, and Sumava Forest Resorts.

With the coming of the railroads in 1859, the area had easy access to markets and agriculture began to expand. The crops grown included corn, oats, soybeans, hay, wheat, rye, buckwheat, potatoes, and fruits (Newton County Agricultural Stabilization and Conservation Service and others, 1977).

Physiography

Newton County is covered by a thin mantle of heterogeneous glacial drift, glaciofluvial deposits, and glaciolacustrine deposits. These deposits vary from a few feet to more than 100 feet in thickness. The underlying bedrock in the northwest corner of the county is primarily of Silurian age. The rest of the county is underlain by bedrock of Devonian age.

Newton County is mostly a flat plain dissected by the Iroquois and Kankakee Rivers. The county can be divided into four major physiographic areas—the Kankakee outwash plain, the Iroquois moraine, the Iroquois lacustrine plain, and the Tipton till plain.

The Kankakee outwash plain is characterized by nearly level relief with low meandering sand dunes or ridges that occur irregularly throughout the area. These sand dunes consist of windblown material that varies in height from about 1 foot to 30 feet. The larger dune areas lie in a general northeast-southwest direction and are made up of a series of small ridges. Many of these individual ridges are crescent shaped.

Much of the Kankakee outwash plain was originally covered by marsh and shallow bodies of water. It is said that this area once rivaled Okefenokee Swamp and the Everglades as an area of natural wonder (Alkire, 1978). Beaver Lake was located in the southwest corner of the Kankakee outwash plain.

A number of sandbars and islands dotted Beaver Lake. The largest island was called Bogus Island. It was located near the center of Beaver Lake. These islands were formed when wind and wave action from the west and northwest moved sand up from out of the bottom of the lake and deposited it like drifting snow. Because of the drifting action, a sharp precipice typically formed on the eastern side of the islands. The same wind and wave action was responsible for creating an undulating beach ridge along the eastern edge of Beaver Lake.

The Iroquois moraine crosses the county in a southwest to northeast direction. It averages about 2½ miles wide and can be traced from just south of Morocco to the area north of Mt. Ayr. The southern edge of the moraine is characterized by rolling topography and geologic material that is typically a homogeneous accumulation of loam, silty clay loam, silty clay, and clay glacial deposits. The topography is gently undulating on the northern side of the moraine. The geologic material in this area is a mixture of stratified and unstratified glacial deposits of sand, silt, and clay. Much of the Iroquois moraine has a sand cap that varies from a few inches to 3 or 4 feet in thickness. Typically, this sand cap is thickest along the northern side of the moraine. Sand ridges more than 6 feet thick are in some of these areas.

The Iroquois lacustrine plain is oriented in a northeast-southwest direction. The topography in this area is generally nearly level with occasional low sand ridges rising a few feet above the general ground level. The geologic material on the east side of this area typically consists of a thin mantle of sandy and silty material over heavy lacustrine clays. The western side of the Iroquois lacustrine plain consists of stratified silts, clays, and fine sands that have been deposited over unstratified glacial deposits. The stratified material ranges from a few inches to several feet in thickness. Geologic erosion has exposed areas of glacial till along the Iroquois River and some of its tributaries.

The Tipton till plain covers the extreme southern part of the county. The topography in this area can be characterized as gently undulating, except for an area about 1 mile wide along the Benton-Newton county line. The topography in this area is gently rolling and consists of geologic material that is typically homogeneous, unsorted glacial till. Geologic material in the gently undulating areas typically is glacial outwash and glacial till. A few areas of this physiographic unit have bedrock near the surface. Bedrock outcrops occur along ditches south and east of Goodland.

Drainage and Relief

Newton County lies in the Kankakee River drainage basin. The northern one-third of the county drains westward through the Kankakee River and its many tributaries. Beaver Creek and the Iroquois River and their tributaries dissect the southern two-thirds of the county. Much of the central part of the county is drained by Beaver Creek and its tributaries. A small area along the east-central part of the county is drained by Curtis Creek. Curtis Creek flows east into Jasper County, where it empties into the Iroquois River. The southern part of Newton County is drained by the Iroquois River and its tributaries. Beaver Creek and the Iroquois River flow westward and empty into the Kankakee River in Illinois. J.C. Murphy Lake is the only major lake in the county. A few small ponds have been constructed.

The average elevation of Newton County is about 655 feet above sea level (Rogers, 1955). The highest point in the county is about 770 feet above sea level. It is in Grant Township, in the southeast corner of section 36. The lowest point in the county is about 630 feet above sea level. It is in the northwest corner of Lake Township where the Kankakee River flows into Illinois. The total relief is approximately 140 feet, and maximum local relief is about 60 feet (Rogers, 1955).

Natural Resources

Soil is one of the most important natural resources in the county. Livestock and crops are marketable products that depend on the soil.

When the pioneers of the 1830's began settling in Newton County, they discovered an area of land in the southern part of the county where a large rock formation was almost completely exposed. Between 360 million and 400 million years ago, a terrific upheaval occurred in the area east of Kentland. The cause of this upheaval has baffled geologists. The force of the upheaval was great enough to pick up beds of Ordovician aged rock 400 feet in height and stand them vertically 1,500 feet above where they would normally be, with the rock strata running in every conceivable direction (fig. 2). Because of this unusual formation, Newton County has been listed as the location of one of nature's geological wonders in texts dating back to the 1830's.

Two basic theories regarding the history of this rock formation have been developed. According to one theory, the upheaval was caused by volcanic activity in the area. The deep rock gave way under pressure from internal stresses in the earth, causing the fault to shift or causing the squeezing of a "plug" of molten rock upward toward the surface. The more accepted theory involves a large meteorite, which entered the earth's atmosphere traveling at a high rate of speed and crashed at this site. Evidence in support of this theory is the presence of a rare mineral, coesite, known to be formed when meteorites strike the earth.

The land surrounding this formation was not considered of value to the early settlers, except for the small rocks they used as foundations for their homes and outbuildings. The formation remained virtually untouched until the early 1890's. Eventually this large rock formation became an abundant source of raw materials for the building of county roads. Since 1946, this rock has supplied most of the crushed stone and agricultural limestone for northwestern Indiana and east-central Illinois. Because of the extreme hardness and the high quality of the stone quarried, it is currently being used for anti-skid asphalt surface as far away as southern Illinois.

The first quarry began operation in the 1890's, about 60 years after the pioneer settlers discovered the limestone on the ground. Over the years, two additional quarries were opened. Currently the only quarry still in operation is the one that was established last. The stone quarry has been mined in 40-foot layers, and one part of the pit is now seven layers deep.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Kentland in the period 1961 to 1990. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 25 degrees F and the average daily minimum temperature is 16 degrees. The lowest temperature on record, which occurred at Kentland on January 20, 1985, is -25 degrees. In summer, the average temperature is 72 degrees and the average daily maximum temperature is 83 degrees. The highest recorded temperature, which occurred on August 19, 1988, is 104 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 37.32 inches. Of this, 22.96 inches, or about 62 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 6.4 inches at Kentland on July 22, 1963. Thunderstorms occur on about 39

Figure 2.—This unusual formation of limestone, caused by some unknown force, is in southern Newton County.

days each year, and most occur in June.

The average seasonal snowfall is 28.3 inches. The greatest snow depth at any one time during the period of record was 19 inches. The heaviest 1-day snowfall on record was 11 inches on December 19, 1973. On the average, 45 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 62 percent. Humidity is higher at night, and the average at dawn is about 82 percent. The sun shines 74 percent of the time possible in summer and 45 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 12 miles per hour, in March.

Water Supply

Water for domestic use and for livestock is obtained from wells. Ditches, streams, and rivers also supply water for livestock. In the Kankakee outwash area, water is obtained through sand points that are driven 5 to 15 feet deep. Brook, Goodland, Kentland, and Morocco have municipally owned water supplies. These communities get their water from deep wells that have been drilled into unconsolidated sand and gravelly sand

or into Silurian, Devonian, and Mississippian age carbonate bedrock.

Transportation Facilities

There are about 120 miles of Federal and State roadways dissecting Newton County. North-south travel is facilitated by Federal Highway 41 and State Highway 55. East-west travel is facilitated by Federal Highway 24 and State Highways 10, 14, 114, and 16. The remaining county roads, which are thoroughfares and primary roads, make up about 660 miles in the county. About 55 percent of them are paved.

Two public airports serve Newton County. Both the Kentland Municipal Airport and the Lake Village Airport provide air freight and commuter services. A few small private airstrips are located throughout the county.

There are four railroad lines that traverse Newton County. The major north-south railroad line runs from Kentland to Lake Village and parallels Federal Highway 41. The primary east-west railroad line runs from Goodland to Kentland and parallels Federal Highway 24. Two other rail lines cross the southwest and northeast corners of the county. Railroads have played an important role in the development of agriculture in Newton County. They have enabled farmers to export grain to Chicago and other outside markets. In the past they transported most of the livestock sold to slaughterhouses outside Newton County.

Manufacturing and Agricultural Business Services

Agriculture forms the economic basis of Newton County and supports an abundance of associated businesses and manufacturers. Firms are actively engaged in research, in processing food products, and in manufacturing storage bins and grain handling systems.

The county supports beef, hogs, poultry, and some dairy operations. Commodity brokers, butchers, livestock breeders, and veterinarians are also active in the county.

Local agencies provide farm management services, aerial crop dusting, and grain elevators for exchange and storage. Farm suppliers include equipment dealers, seed and fertilizer dealers, and agricultural builders. Numerous drainage contractors are located throughout the county. There are also suppliers of gravel, sand, and topsoil.

Trends in Population and Land Use

According to the 1980 census, Newton County had a population of 14,844. In 1985, the population was officially estimated at 14,390. The population density is 33 people per square mile, according to a 1990 estimate. This number represents a decline of two people per square mile since 1985 and four people per square mile since 1980.

The population of Newton County grew from 2,360 in 1860 to 9,540 in 1910. Thus, during the first 50 years of the county's existence, the population increased by 7,180. During the subsequent 50 years, however, the population grew by only about 2,000.

The average farm size was 237 acres in 1950 (Rogers, 1955), 427 acres in 1974, 421 acres in 1978 (U.S. Department of Commerce, 1980), and 440 acres in 1982 (U.S. Department of Commerce, 1983). There were 905 farms in 1950 (Rogers, 1955), 556 in 1974, 571 in 1978 (U.S. Department of Commerce, 1980), and 504 in 1982 (U.S. Department of Commerce, 1983). In 1974, about 38 percent of the farmers worked away from their farms for additional income. This percentage decreased to about 32 percent in 1978 but had risen to 50 percent by 1987.

Cropland accounts for 80 percent of the acreage in the county, or roughly 205,600 acres. Of this acreage, 2,300 acres is used for hay and pasture in a rotation system. According to 1987 Agricultural Stabilization and Conservation Service figures, about 7,700 acres, or 3 percent of the county, is permanent pasture. The remaining acreage is used for corn and soybeans.

Today, Newton County is characterized by scattered rural farm and nonfarm residents. Brook, Goodland, Kentland, and Morocco are the major incorporated communities. Close proximity to industrial areas makes the county a prime rural residential area.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of

soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Some of the boundaries on the maps of this soil survey do not match those on the maps of the surveys of adjacent counties, and some of the soil names and descriptions do not fully agree. The differences result from improvements in the classification of soils, particularly modifications or refinements in soil series concepts, or from variations in the intensity of mapping or in the extent of the soils in the survey areas.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by two or three kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use

or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map in this publication shows the soil associations in this survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soil Descriptions

Dominantly Nearly Level, Very Poorly Drained Soils; on Flood Plains

These soils make up about 3 percent of the county. They are used for cultivated crops, pasture, wildlife habitat, or woodland. Wetness, ponding, and flooding are the main management concerns.

1. Craigmile-Prochaska Association

Very deep, nearly level, very poorly drained, medium and coarse textured soils that formed in loamy alluvium over sandy alluvium or in sandy alluvium; on flood plains

This association is in nearly level or slightly depressional areas on flood plains that are characterized by a gradual swale-and-swell topography. Slopes are 0 to 2 percent.

This association makes up about 2 percent of the county. It is about 73 percent Craigmile soils, 22 percent Prochaska soils, and 5 percent soils of minor extent.

Craigmile soils are in broad depressional areas on flood plains. Typically, the surface layer is very dark brown mucky silt loam. The subsurface layer is very dark gray loam.

Prochaska soils are in broad depressional areas on flood plains. Typically, the surface soil is black loamy sand. The subsoil is dark gray, black, and grayish brown, mottled loamy sand.

Of minor extent in this association are the somewhat poorly drained Algansee soils on slightly convex rises.

This association is used mainly for cultivated crops, as woodland, or as habitat for wetland wildlife. Corn, soybeans, and small grain are the major crops. Earthen dikes and dams have been constructed in many areas to minimize the hazard of flooding, and extensive areas have been drained.

Drained areas of this association are fairly well suited to cultivated crops. Undrained areas are generally unsuited to this use. If drained, the soils in this association are well suited to hay and pasture. Flooding, ponding, and wetness are the main management concerns. Before any type of drainage system can be installed for cropland use, major land reclamation is required.

Craigmile soils are poorly suited to trees, but Prochaska soils are fairly well suited. Equipment limitations, seedling mortality, the windthrow hazard, and plant competition are management concerns.

This association is generally unsuited to building site development and sanitary facilities. The flooding and the ponding are the main limitations.

2. Sawabash-Comfrey Association

Very deep, nearly level, very poorly drained, moderately fine or medium textured soils that formed in silty and loamy alluvium or in loamy alluvium; on flood plains

This association is in nearly level or slightly depressional areas on flood plains that are characterized by a gradual swale-and-swell topography. Slopes are 0 to 2 percent.

This association makes up about 1 percent of the county. It is about 49 percent Sawabash soils, 46 percent Comfrey soils, and 5 percent soils of minor extent.

Sawabash soils are in depressional areas on flood

plains along major streams. Typically, the surface layer is black silty clay loam. The subsurface layer is black and very dark gray, mottled silty clay loam.

Comfrey soils are in depressional areas on flood plains along tributaries to major streams. Typically, the surface soil is very dark gray and black loam. The subsoil is gray, mottled loam.

Of minor extent in this association are the well drained Ross soils on convex rises.

This association is used mainly as pasture or woodland. A few areas are used for cultivated crops.

This association is generally unsuited to cultivated crops and hay. It is poorly suited to pasture. Flooding and wetness are the main management concerns. Clearing and draining areas of these soils for cultivation and protecting them from flooding are generally not economically feasible because the delineations are too narrow.

Sawabash soils are well suited to trees. Comfrey soils are not rated for woodland. Equipment limitations, seedling mortality, and plant competition are management concerns.

This association is generally unsuited to building site development and sanitary facilities because of the flooding. The ponding is also a limitation in areas of the Sawabash soils.

Dominantly Nearly Level or Gently Sloping, Very Poorly Drained or Somewhat Poorly Drained Soils; on Uplands

These soils make up about 26 percent of the county. They are used mainly for cultivated crops. A few areas are used as pasture, wildlife habitat, or woodland. Wetness, ponding, soil blowing, and droughtiness are the main management concerns.

3. Granby-Maumee-Zadog Association

Very deep, nearly level, very poorly drained, coarse textured soils that formed in sandy sediments; on outwash plains or lake plains

This association is in nearly level or slightly depressional areas on outwash plains or lake plains that are characterized by a gradual swale-and-swell topography. Slopes are 0 to 2 percent.

This association makes up about 22 percent of the county. It is about 49 percent Granby soils, 20 percent Maumee soils, 16 percent Zadog soils, and 15 percent soils of minor extent.

Granby soils are in broad, nearly level or slightly depressional areas. Typically, the surface soil is black and very dark gray loamy fine sand. The subsoil is dark gray, mottled fine sand and light brownish gray, mottled sand.

Maumee soils are in broad, nearly level or slightly depressional areas. Typically, the surface soil is black and very dark gray loamy fine sand.

Zadog soils are in broad, nearly level or slightly depressional areas. Typically, the surface soil is black loamy sand and black, mottled fine sandy loam. The subsoil is brown, mottled fine sandy loam; reddish brown, mottled sandy clay loam; and grayish brown, mottled fine sand.

Of minor extent in this association are the somewhat poorly drained Morocco and Watseka soils in nearly level areas or on slightly convex rises and the moderately well drained Nesius soils on convex rises.

Most areas of this association are drained and are used for cultivated crops. A few areas are used as pasture or woodland. Corn, soybeans, and small grain are the major crops.

This association is fairly well suited to cultivated crops. It is well suited to hay and pasture. Wetness, ponding, soil blowing, and droughtiness are the main management concerns.

This association is fairly well suited to trees. Equipment limitations, seedling mortality, the windthrow hazard, and plant competition are management concerns.

This association is generally unsuited to building site development and sanitary facilities. The ponding and the seasonal high water table are the main limitations.

4. Conrad-Zaborosky-Kentland Association

Very deep, nearly level or gently sloping, very poorly drained or somewhat poorly drained, coarse textured soils that formed in sandy sediments or in organic material over sandy sediments; on lake beds or lake plains

This association is in nearly level or slightly depressional areas on lake plains or lake beds that are characterized by a gradual swale-and-swell topography. Slopes range from 0 to 4 percent.

This association makes up about 4 percent of the county. It is about 43 percent Conrad soils, 18 percent Zaborosky soils, 17 percent Kentland soils, and 22 percent soils of minor extent.

The very poorly drained Conrad soils are in broad, nearly level or slightly depressional areas. Typically, the surface layer is very dark gray loamy fine sand.

The somewhat poorly drained Zaborosky soils are on nearly level or gently sloping rises. Typically, the surface layer is very dark gray fine sand. The next layer is pale brown fine sand. Below this is a buried surface layer of black loamy sand that has strata of black muck.

The very poorly drained Kentland soils are in broad, nearly level or slightly depressional areas. Typically, the

surface soil is black mucky fine sand. The next layer is very dark grayish brown muck.

Of minor extent in this association are the somewhat poorly drained Tedrow soils on slightly convex rises.

Most areas of this association are used for cultivated crops. A few areas are used as pasture, woodland, or wildlife habitat. Corn, soybeans, and small grain are the major crops.

This association is fairly well suited to cultivated crops. It is well suited to hay and pasture. Wetness, ponding, soil blowing, and droughtiness are the main management concerns.

Conrad and Kentland soils are generally unsuited to building site development and sanitary facilities. Zaborosky soils are poorly suited to these uses. The wetness, the ponding, and a poor filtering capacity are the main limitations.

Dominantly Strongly Sloping to Nearly Level, Well Drained to Somewhat Poorly Drained Soils; on Uplands

These soils make up about 17 percent of the county. They are used mainly as woodland or for cultivated crops. A few areas are used for hay or pasture. Soil blowing, droughtiness, and wetness are the main management concerns.

5. Oakville-Morocco-Brems Association

Very deep, strongly sloping to nearly level, well drained to somewhat poorly drained, coarse textured soils that formed in sandy sediments; on outwash plains

This association is on knolls and ridges on outwash plains that are characterized by a nearly level to strongly sloping topography. Slopes range from 0 to 15 percent.

This association makes up about 17 percent of the county. It is about 39 percent Oakville soils, 22 percent Morocco soils, 21 percent Brems soils, and 18 percent soils of minor extent (fig. 3).

The well drained or moderately well drained Oakville soils are on convex ridges and knolls. Typically, the surface layer is very dark grayish brown fine sand. The subsoil is brown and yellowish brown fine sand.

The somewhat poorly drained Morocco soils are on swells on outwash plains. Typically, the surface layer is very dark grayish brown loamy fine sand. The subsoil is pale brown and yellowish brown, mottled fine sand.

The moderately well drained Brems soils are on slightly convex rises. Typically, the surface layer is dark brown loamy fine sand. The subsoil is dark brown loamy fine sand, yellowish brown loamy sand, and yellowish brown, mottled sand.

Of minor extent in this association are the very poorly drained Granby and Newton soils in depressional areas, the moderately well drained Nesius soils on convex rises, and the somewhat poorly drained Tedrow soils on slightly convex rises.

Most areas of this association are used for cultivated crops, hay, pasture, or woodland. Corn, soybeans, and small grain are the major crops.

This association is poorly suited to cultivated crops. It is well suited to pasture and fairly well suited to hay. Droughtiness, soil blowing, and wetness are the main management concerns.

This association is well suited to trees. Equipment limitations, seedling mortality, and plant competition are the main management concerns.

Oakville and Brems soils are fairly well suited to building site development and sanitary facilities. Morocco soils are poorly suited to these uses. The slope, a poor filtering capacity, and the wetness are the main limitations.

Dominantly Nearly Level, Very Poorly Drained Soils; on Uplands

These soils make up about 2 percent of the county. They are used for cultivated crops. Wetness, ponding, and soil blowing are the main management concerns.

6. Toto-Ackerman-Adrian Association

Very deep, nearly level, very poorly drained soils that formed in organic material over marl, coprogenous earth, and sandy sediments, in organic material over coprogenous earth and sandy sediments, or in organic deposits over sandy sediments; on lake plains and outwash plains

This association is in nearly level or depressional areas on lake plains and outwash plains that are characterized by a gradual swale-and-swell topography. Slopes are 0 to 2 percent.

This association makes up about 2 percent of the county. It is about 27 percent Toto soils, 23 percent Ackerman soils, 13 percent Adrian soils, and 37 percent soils of minor extent.

Toto soils are in depressions. Typically, the surface tier is black muck. The subsurface tier is very dark brown muck; pale brown, mottled marl; dark gray, mottled coprogenous earth; and grayish brown, mottled sand.

Ackerman soils are in depressions. Typically, the surface soil is black muck. The substratum is dark gray coprogenous earth and light yellowish brown, pale brown, and yellowish red, mottled sand.

Adrian soils are in depressions. Typically, the surface soil is black muck. The substratum is gray sand.

Of minor extent in this association are the very poorly

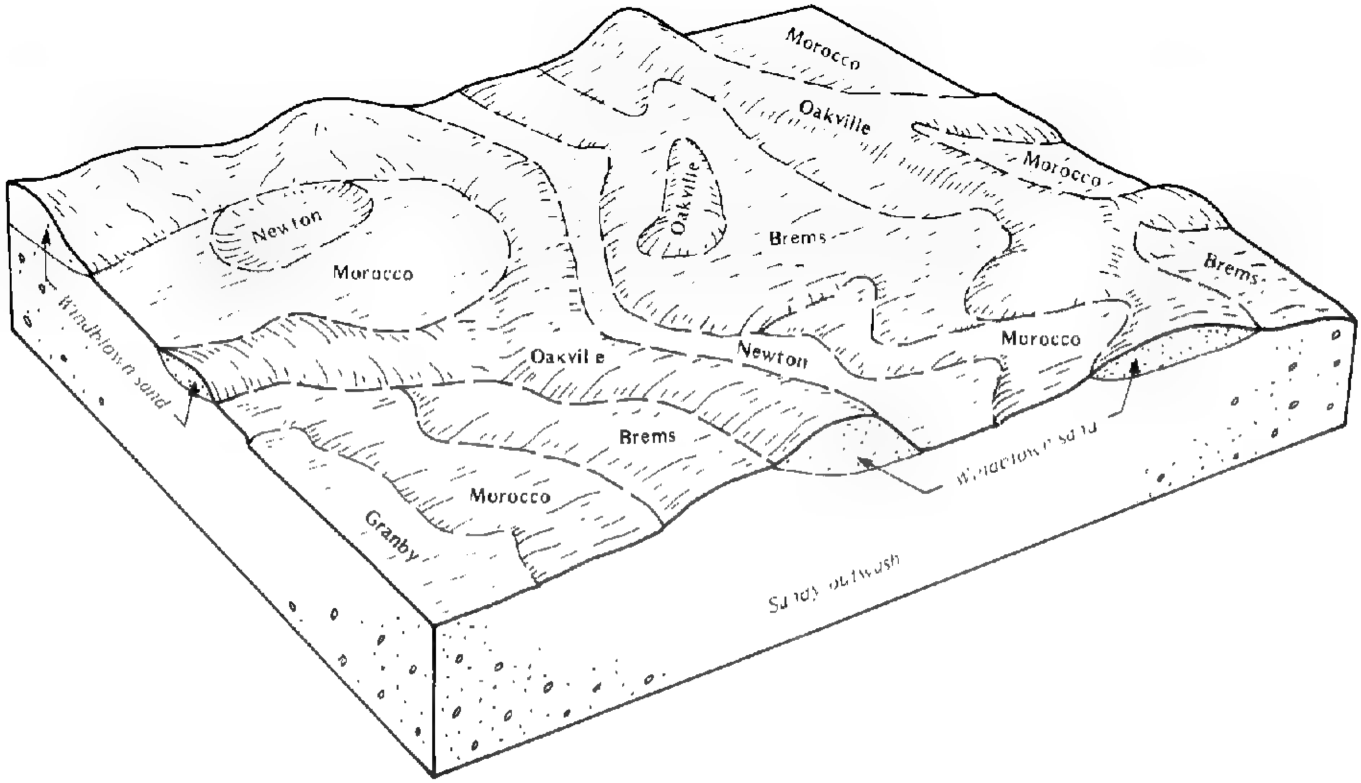

Figure 3.—Typical pattern of soils and parent material in the Oakville-Morocco-Brems association.

drained Adrian Variant, Houghton, and Martisco Variant soils in nearly level areas or in slight depressions.

Most areas of this association are drained and are used for cultivated crops. The soils are well suited to pasture and fairly well suited to hay. Corn and soybeans are the major crops.

This association is poorly suited to cultivated crops. Wetness, ponding, and soil blowing are the main management concerns.

This association is poorly suited to trees. Equipment limitations, seedling mortality, the windthrow hazard, and plant competition are management concerns.

This association is generally unsuited to building site development and sanitary facilities. The ponding and the seasonal high water table are the main limitations.

Dominantly Nearly Level to Moderately Sloping, Poorly Drained to Well Drained Soils; on Uplands

These soils make up about 17 percent of the county. They are used mainly for cultivated crops. A few areas are used for hay or pasture or as woodland. Wetness, ponding, and soil blowing are the main management concerns.

7. Barry-Sumava-Octagon Association

Very deep, nearly level to moderately sloping, poorly drained to well drained, moderately coarse textured soils that formed in glacial till or in loamy outwash over glacial till; on moraines

This association is in nearly level to moderately sloping areas on moraines that are characterized by a swale-and-swell topography. Slopes range from 0 to 12 percent.

This association makes up about 17 percent of the county. It is about 8 percent Barry soils, 8 percent Sumava soils, 7 percent Octagon soils, and 77 percent soils of minor extent.

The poorly drained Barry soils are in broad depressional areas. Typically, the surface layer is very dark gray fine sandy loam. The subsoil is dark gray and gray, mottled loam.

The somewhat poorly drained Sumava soils are on convex rises. Typically, the surface layer is very dark gray fine sandy loam. The subsoil is light olive brown, yellowish brown, and pale brown, mottled fine sandy loam and yellowish brown, mottled loam.

The well drained Octagon soils are on convex rises. Typically, the surface layer is very dark grayish brown fine sandy loam. The subsoil is dark yellowish brown loam and yellowish brown clay loam.

Of minor extent in this association are the somewhat poorly drained Darroch soils that have a sandy substratum on slight rises and the somewhat poorly drained Odell and Ridgeville soils on slight rises; the poorly drained Selma soils that have a sandy substratum and the very poorly drained Gilford soils in nearly level areas or in slight depressions; and, on convex ridges and knolls, the well drained Ayr soils and the moderately well drained Ayrmount, Corwin, and Foresman soils that have a till substratum.

Most areas of this association are used for cultivated crops. A few areas are used for hay, as pasture, or as woodland. Corn, soybeans, and small grain are the major crops.

Barry and Sumava soils are well suited to cultivated crops, and Octagon soils are well suited or fairly well suited. All of the soils in this association are well suited to hay and pasture. Ponding and wetness are the main management concerns in areas of the Barry soils. Wetness is also a concern in areas of the Sumava soils. Soil blowing is a concern in most areas of the association. Controlling runoff and erosion is a concern in areas of the Octagon soils.

Barry soils are well suited to trees. Equipment limitations, seedling mortality, the windthrow hazard, and plant competition are management concerns.

Barry soils are generally unsuited to building site development and sanitary facilities. Sumava soils are poorly suited to these uses, but Octagon soils are well suited. The ponding and the wetness are the major concerns in areas of the Barry soils. The wetness is the major limitation in areas of the Sumava soils. The shrink-swell potential, restricted permeability, and the slope are limitations in areas of the Octagon soils.

Dominantly Nearly Level to Strongly Sloping, Very Poorly Drained to Moderately Well Drained Soils; on Uplands

These soils make up about 35 percent of the county. They are used mainly for cultivated crops. A few areas are used for hay or pasture or as woodland. Wetness, ponding, erosion, and runoff are the main management concerns.

8. Swygert-Bryce-Swygert Variant Association

Very deep, nearly level to strongly sloping, poorly drained to moderately well drained, medium or moderately fine textured soils that formed in glacial till; on recessional moraines

This association is on knolls and in depressional areas on recessional moraines that are characterized by swale-and-swell topography. Slopes range from 0 to 15 percent.

This association makes up about 2 percent of the county. It is about 25 percent Swygert soils, 22 percent Bryce soils, 9 percent Swygert Variant soils, and 44 percent soils of minor extent (fig. 4).

The somewhat poorly drained Swygert soils are on swells. Typically, the surface soil is very dark grayish brown silt loam and silty clay loam. The subsoil is dark brown, brown, olive gray, and light olive gray, mottled silty clay.

The poorly drained Bryce soils are in broad depressional areas. Typically, the surface soil is black silty clay loam. The subsoil is dark gray, gray, and grayish brown, mottled silty clay.

The moderately well drained Swygert Variant soils are on convex ridges. Typically, the surface layer is very dark grayish brown loam. The subsoil is yellowish brown silty clay loam and yellowish brown, mottled silty clay.

Of minor extent in this association are the somewhat poorly drained Papineau soils on slight rises and the moderately well drained Simonin soils on convex rises and knolls.

Most areas of this association are used for cultivated crops. A few areas are used for hay or pasture. Corn, soybeans, and small grain are the major crops.

Swygert and Bryce soils are well suited to cultivated crops, and Swygert Variant soils are fairly well suited. All of the soils in this association are well suited to hay and pasture. Wetness is the main management concern in areas of the Swygert soils. Wetness and ponding are the main concerns in areas of the Bryce soils. Controlling runoff and erosion is a concern in areas of the Swygert Variant soils.

Swygert and Swygert Variant soils are poorly suited to building site development and sanitary facilities because of the shrink-swell potential, the wetness, and restricted permeability. Bryce soils are generally unsuited to these uses because of the ponding and the seasonal high water table.

9. Montgomery-Strole-Simonin Association

Very deep, nearly level to strongly sloping, very poorly drained to moderately well drained, moderate fine or coarse textured soils that formed in lacustrine sediments

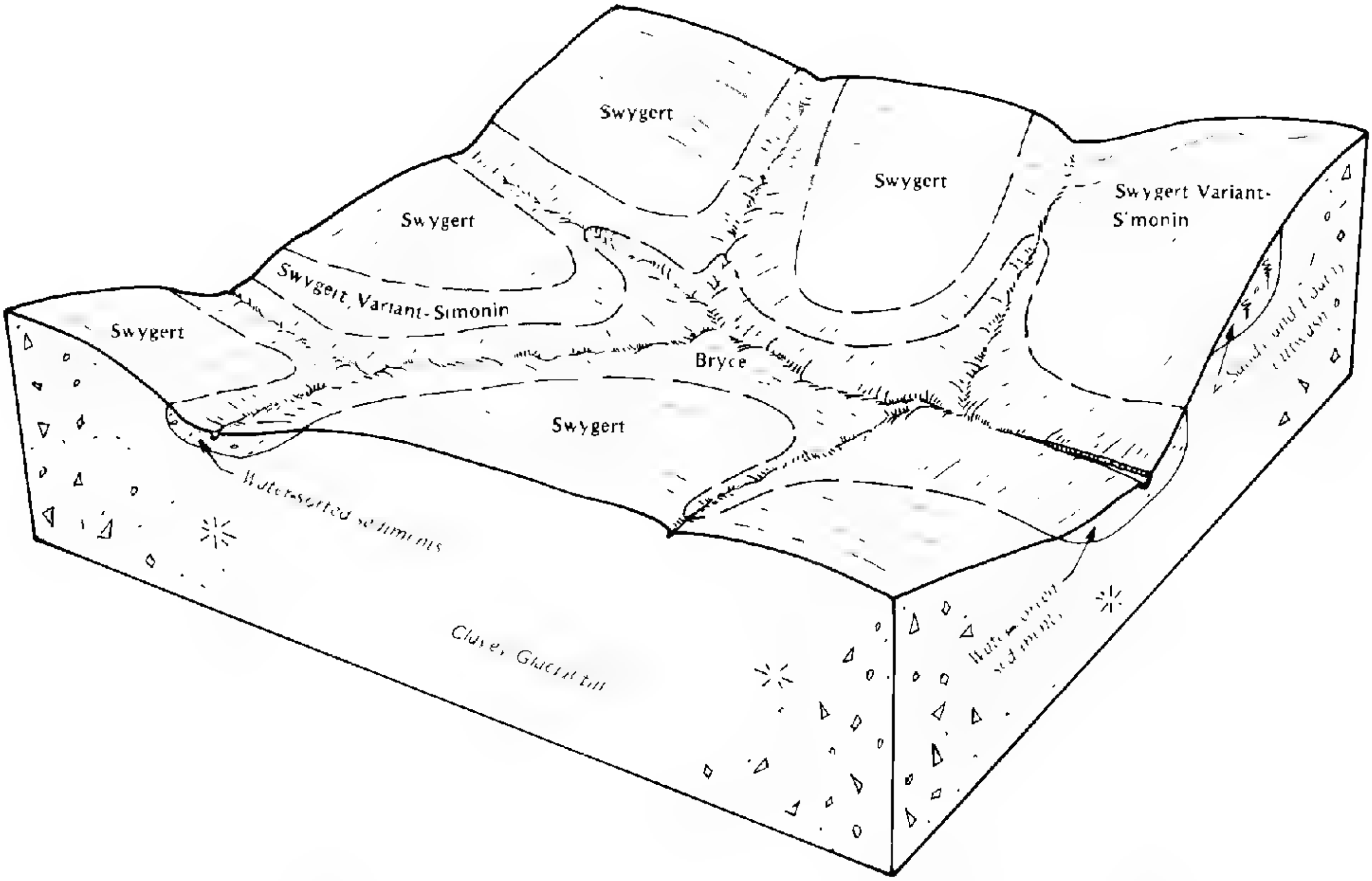

Figure 4.—Typical pattern of soils and parent material in the Swygert-Bryce-Swygert Variant association.

or in sandy and loamy outwash over lacustrine sediments; on lake plains

This association is in broad depressions and on slightly convex rises on lake plains that are characterized by a gradual swale-and-swell topography. Slopes range from 0 to 3 percent.

This association makes up about 5 percent of the county. It is about 25 percent Montgomery soils, 15 percent Strole soils, 14 percent Simonin soils, and 46 percent soils of minor extent (fig. 5).

The very poorly drained Montgomery soils are in broad depressional areas. Typically, the surface soil is black silty clay loam; black, mottled silty clay loam; and very dark gray, mottled silty clay. The subsoil is gray, mottled silty clay and light gray and grayish brown, mottled silty clay loam.

The somewhat poorly drained Strole soils are on swells. Typically, the surface soil is very dark gray and very dark grayish brown silty clay loam. The subsoil is yellowish brown and brown, mottled silty clay.

The moderately well drained Simonin soils are on slightly convex rises. Typically, the surface layer is very dark grayish brown loamy sand. The subsoil is yellowish brown sand; yellowish brown, mottled sandy loam; and yellowish brown, mottled silty clay.

Of minor extent in this association are the very poorly drained Iroquois soils in nearly level or slightly depressional areas and the somewhat poorly drained Papineau and Wesley soils on slightly convex rises.

Most areas of this association are used for cultivated crops. A few areas are used for hay or pasture.

Montgomery soils are fairly well suited to cultivated crops, and Strole and Simonin soils are well suited. All of the soils in this association are well suited to hay and pasture. Wetness is the main management concern in areas of the Montgomery and Strole soils. Ponding is also a concern in areas of the Montgomery soils. Droughtiness and soil blowing are the main concerns in areas of the Simonin soils.

Montgomery soils are well suited to trees. Equipment

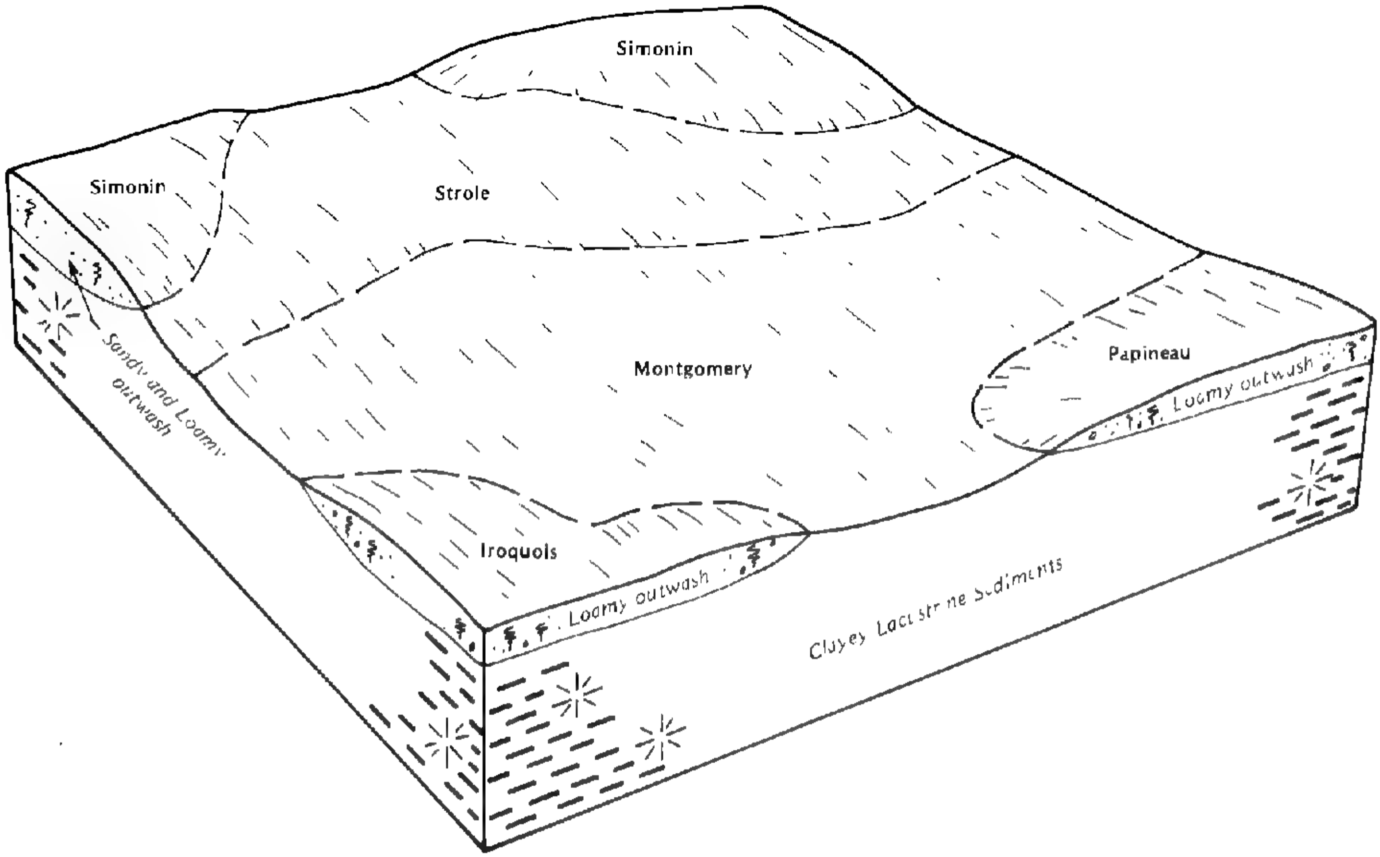

Figure 5.—Typical pattern of soils and parent material in the Montgomery-Strole-Simonin association.

limitations, seedling mortality, the windthrow hazard, and plant competition are management concerns.

Montgomery soils are generally unsuited to building site development and sanitary facilities. Strole soils are poorly suited to these uses, but Simonin soils are fairly well suited. The ponding, the wetness, restricted permeability, and the shrink-swell potential are the major limitations.

10. Selma, Till Substratum-Darroch, Till Substratum-Foresman, Till Substratum Association

Very deep, nearly level or gently sloping, poorly drained to moderately well drained, moderately fine or medium textured soils that formed in loamy outwash over glacial till; on ground moraines

This association is in nearly level or gently sloping, convex areas on ground moraines that are characterized by a swale-and-swell topography. The major soils have a till substratum. Slopes range from 0 to 6 percent.

This association makes up about 14 percent of the county. It is about 35 percent Selma soils, 30 percent Darroch soils, 14 percent Foresman soils, and 21 percent soils of minor extent.

The poorly drained Selma soils that have a till substratum are in broad depressional areas. Typically, the surface soil is black silty clay loam. The subsoil is dark gray and gray, mottled clay loam.

The somewhat poorly drained Darroch soils that have a till substratum are on swells. Typically, the surface layer is very dark gray loam. The subsoil is dark grayish brown clay loam and brown and yellowish brown, mottled clay loam.

The moderately well drained Foresman soils that have a till substratum are on convex ridges and knolls. Typically, the surface layer is very dark grayish brown silt loam. The subsoil is dark brown clay loam; dark yellowish brown, mottled clay loam; and yellowish brown, mottled loam.

Of minor extent in this association are the somewhat poorly drained Ridgeville soils on slight rises and the moderately well drained Onarga soils on convex rises and knolls.

Most areas of this association are used for cultivated crops. A few areas are used for hay or pasture.

This association is well suited to cultivated crops and to hay and pasture. Wetness, erosion, and runoff are the main management concerns.

The soils in this association are generally unsuited to building site development and sanitary facilities. Ponding, the shrink-swell potential, restricted permeability, and the wetness are the main limitations.

11. Selma-Darroch-Foresman Association

Very deep, nearly level or gently sloping, poorly drained to moderately well drained, medium textured soils that formed in loamy outwash or in silty and loamy sediments; on outwash plains

This association is in broad depressions and on slightly convex rises on outwash plains that are characterized by a gradual swale-and-swell topography. Slopes range from 0 to 6 percent.

This association makes up about 9 percent of the county. It is about 48 percent Selma soils, 37 percent Darroch soils, 11 percent Foresman soils, and 4 percent soils of minor extent.

The poorly drained Selma soils are in broad depressional areas. Typically, the surface soil is very dark grayish brown silt loam. The subsoil is dark grayish brown, grayish brown, and light brownish gray, mottled loam and clay loam.

The somewhat poorly drained Darroch soils are on slightly convex rises. Typically, the surface layer is very dark grayish brown silt loam. The subsurface layer is very dark gray silt loam. The subsoil is brown, mottled silty clay loam and yellowish brown, mottled clay loam and loam.

The moderately well drained Foresman soils are on slightly convex rises. Typically, the surface layer is very dark gray silt loam. The subsoil is yellowish brown clay loam and yellowish brown, mottled clay loam.

Of minor extent in this association are the somewhat poorly drained Papineau soils on slight rises and the very poorly drained Iroquois soils in nearly level or slightly depressional areas.

Most areas of this association are used for cultivated crops. A few areas are used for hay or pasture or as woodland. Corn, soybeans, and small grain are the major crops.

This association is well suited to cultivated crops and to hay and pasture. Ponding, wetness, erosion, and runoff are the main management concerns.

Selma soils are generally unsuited to building site development and sanitary facilities. Darroch and Foresman soils are poorly suited to these uses. The ponding, the wetness, and restricted permeability are the main limitations.

12. Selma, Till Substratum-Barce-Gilboa Association

Very deep, nearly level or gently sloping, poorly drained to moderately well drained, moderately fine or medium textured soils that formed in loamy outwash over glacial till or in silty and loamy outwash over glacial till; on ground moraines

This association is on knolls and in depressional areas on ground moraines that are characterized by a swale-and-swell topography. Slopes range from 0 to 4 percent.

This association makes up about 5 percent of the county. It is about 56 percent Selma soils that have a till substratum, 20 percent Barce soils, 16 percent Gilboa soils, and 8 percent soils of minor extent (fig. 6).

The poorly drained Selma soils that have a till substratum are in depressions and swales. Typically, the surface layer is black silty clay loam. The subsoil is dark gray and gray, mottled clay loam.

The moderately well drained Barce soils are on rises and knolls. Typically, the surface layer is very dark grayish brown loam. The subsoil is yellowish brown clay loam and sandy clay loam and light olive brown, mottled loam.

The somewhat poorly drained Gilboa soils are on slight rises. Typically, the surface layer is very dark gray silt loam. The subsoil is brown, mottled silty clay loam; dark brown, mottled clay loam; and grayish brown, mottled loam.

Of minor extent in this association are the somewhat poorly drained Odell soils on slight rises and the moderately well drained Montmorenci soils on convex rises.

Most areas of this association are used for cultivated crops. A few areas are used for hay or pasture. Corn, soybeans, and small grain are the major crops.

This association is well suited to cultivated crops and to hay and pasture. Ponding, wetness, erosion, and runoff are the main management concerns.

The Selma soils that have a till substratum are generally unsuited to building site development and sanitary facilities. Gilboa and Barce soils are poorly suited to these uses. The ponding, the wetness, restricted permeability, and the shrink-swell potential are the main limitations.

Broad Land Use Considerations

The soils in Newton County vary widely in their suitability for major land uses. The general soil map is

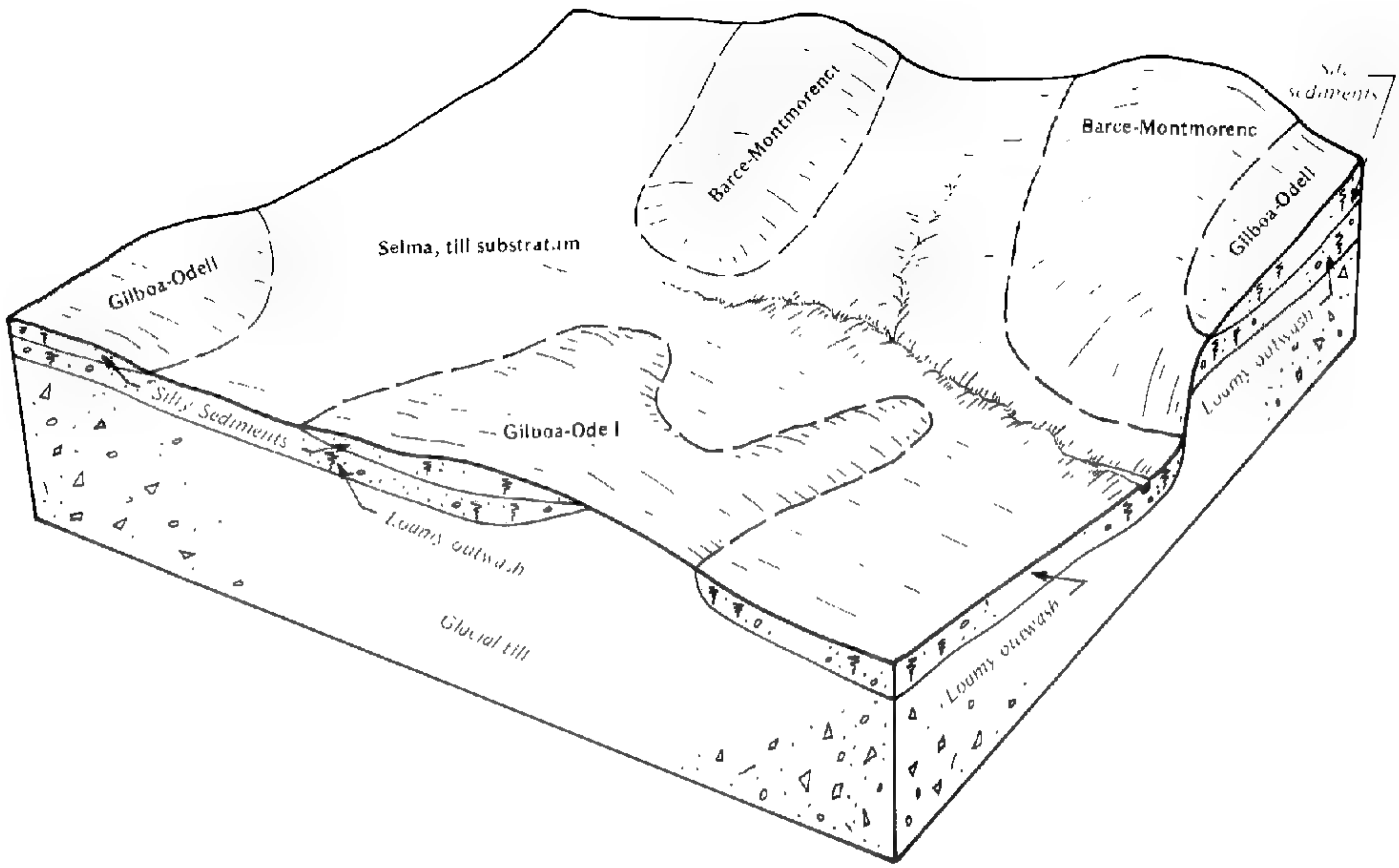

Figure 6.—Typical pattern of soils and parent material in the Selma, till substratum-Barce-Gilboa association.

useful in planning land use changes, but it should not be used for selecting sites for specific structures. The information in this survey can be helpful in planning future land use patterns.

About 12.7 percent of the survey area, or about 32,800 acres, is considered urban land or built-up land. This acreage includes areas used for roads, villages, farmsteads, and rural development. Each year small areas in the county are developed for nonagricultural uses. As long as the demand for these uses exists, planning is needed for orderly growth. The soil and water resources in the county should be considered.

Some of the soils in Newton County have severe limitations and may not be practical for urban development. In the Craigmile-Prochaska, Sawabash-Comfrey, Granby-Maumee-Zadog, Conrad-Zaborosky-Kentland, Toto-Ackerman-Adrian, and Swygert-Bryce-Swygert Variant associations and in many areas of the remaining associations, the water table is above or near the surface during part of the year. Providing drainage systems and proper outlets that would lower the water table enough to permit urban development is costly. In addition to the wetness, the soils in these associations have severe limitations affecting septic tank absorption fields. These limitations include a hazard of flooding, a poor filtering capacity, and restricted permeability. Onsite evaluation is necessary in these areas. Extensive drainage systems, properly designed sanitary facilities, and careful placement of buildings may be needed.

The Oakville and Brems soils in the Oakville-Morocco-Brems association, the Octagon soils in the Barry-Sumava-Octagon association, the Simonin soils in the Montgomery-Strole-Simonin association, the Foresman soils in the Selma, till substratum-Darroch, till substratum-Foresman, till substratum, and Selma-Darroch-Foresman associations, and the Barce soils in the Selma, till substratum-Barce-Gilboa association have some limitations that affect urban development. They are fairly well suited or well suited to urban uses, however, if proper designs are used.

Most of the soils in Newton County are well suited or fairly well suited to cultivated crops, pasture, and hay. Wetness is the main limitation in most areas. The water

table can be lowered with adequate drainage systems. In the more sloping areas, controlling runoff and erosion is necessary to prevent excessive soil loss, especially in the Barry-Sumava-Octagon and Swygert-Bryce-Swygert Variant associations. Undrained areas of the Craigmile-Prochaska and Sawabash-Comfrey associations are generally unsuited to cultivated crops because of flooding during the growing season. The Oakville-Morocco-Brems association is poorly suited to cultivated crops, mainly because of droughtiness and soil blowing. In most other areas, however, the soils can produce good yields and provide excellent pasture if good management practices are applied and the proper crops are selected.

Most of the soils in Newton County are well suited or fairly well suited to woodland. Small woodlots are throughout the county, but most of the woodland is in areas of the Oakville-Morocco-Brems and Barry-Sumava-Octagon associations. The Toto-Ackerman-Adrian association is the only association in the county that is poorly suited to woodland. It is limited by excess water and mucky soils.

Detailed Soil Map Units

The map units on the detailed soil maps that accompany this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information is provided under the heading "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the substratum. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Foresman silt loam, 2 to 6 percent slopes, eroded, is a phase of the Foresman series.

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Martinsville-Williamstown complex, 0 to 2 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. The map unit Pits, quarry, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

Ac—Ackerman-Martisco Variant complex, drained. These very deep, nearly level, very poorly drained soils are in depressional areas. The Ackerman soil is in the lower lying areas. The Martisco Variant soil is on the margins of the unit or on very slight rises. The soils are frequently ponded for brief periods by surface runoff from areas of surrounding soils. Individual areas of this unit are irregularly shaped and range from 10 to more than 120 acres in size. The dominant size is about 35 acres. The unit is about 55 percent Ackerman soil and 30 percent Martisco Variant soil. The two soils occur as areas so intricately mixed or so small that it is not practical to separate them in mapping.

Typically, the surface soil of the Ackerman soil is black muck about 8 inches thick. The substratum extends to a depth of about 60 inches. It is dark gray, mottled coprogenous earth in the upper part and light yellowish brown, pale brown, and yellowish red, mottled sand in the lower part. In a few areas the substratum is loamy material. In places the coprogenous earth extends below a depth of 30 inches, is within a depth of 4 inches, or does not occur. In a few places the depth

to coprogenous earth is more than 14 inches.

Typically, the surface layer of the Martisco Variant soil is dark reddish brown mucky loam about 10 inches thick. The substratum extends to a depth of about 60 inches. In sequence downward, it is reddish gray and gray, mottled marl; dark grayish brown, mottled coprogenous earth; dark greenish gray, mottled coprogenous earth that has thin strata of loamy sand and sand; and reddish gray and dark brown, mottled sand. In some areas the substratum is loamy material. In places, the surface layer is muck and the substratum does not have marl or coprogenous earth.

Included with these soils in mapping are some small areas of the very poorly drained Kentland and Toto soils. These included soils are in landscape positions similar to those of the major soils. Kentland soils do not have coprogenous earth in the profile. Toto soils formed in organic material over marl, coprogenous earth, and sandy deposits. Included soils make up about 10 percent of the map unit.

The available water capacity is moderate in the Ackerman and Martisco Variant soils. Permeability is slow in the coprogenous earth, variable in the marl, and rapid in the underlying sandy material. The content of organic matter in the surface layer is very high. Runoff is very slow or ponded. The soils have a high water table at or above the surface from late fall through early spring.

Most areas are used for cultivated crops.

These soils are poorly suited to corn and soybeans. Wetness, ponding, and soil blowing are the main management concerns. Ponded areas hinder the use of equipment, and machinery bogs down when the soils are wet. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring, thus allowing the planting of longer season varieties of adapted crops. The wetness can be reduced by controlling the water table with open ditches, surface drains, and subsurface drains. Pumping can be used in areas where a suitable outlet is not available. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Excessive drainage by subsurface drainage systems may cause droughtiness. Drainage systems should be designed so that they keep the water table at the level required by crops during the growing season and raise the water table to the surface during the rest of the year. Such systems minimize oxidation and subsidence of the organic material and reduce the hazard of soil blowing. As organic material is lost, the coprogenous earth becomes exposed at the surface. The coprogenous earth becomes cloddy and extremely difficult to rewet if it is allowed to dry out, and thus it becomes unstable. Caution is needed if heavy equipment is used near ditches. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. The soils are well suited to the spring plow cropping system.

These soils are fairly well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay. They are well suited to pasture. Soil blowing, ponding, and the possibility of the muck burning are concerns. Frost heaving, excess water, and the subsidence of the muck after drainage are additional concerns. Other management concerns are overgrazing and grazing when the soil is too wet. A permanent cover of grasses and legumes helps to control soil blowing. Ponded areas hinder the use of equipment, and machinery bogs down if the soils are wet. Management of the water table determines the rate at which the muck oxidizes. Overdrainage increases this rate. If drainage outlets are provided, excess water can be removed by surface drains, subsurface drains, pumping, or a combination of these practices. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Overgrazing reduces plant density and hardiness. Grazing during wet periods reduces forage yields, damages the sod, and reduces plant density and hardiness. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted legumes. Proper stocking rates, timely deferment of grazing, and restricted use during wet periods maintain good plant density and hardiness and help to keep the pasture in good condition.

These soils are poorly suited to trees. The main management concerns are equipment limitations, seedling mortality, the windthrow hazard, and plant competition. The equipment limitations can be overcome by delaying timber harvest until dry periods or until the soil is frozen. Planting more trees than is necessary can help to overcome seedling mortality, but thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Selecting water-tolerant species helps to overcome the windthrow hazard. Harvest methods that do not leave the remaining trees isolated or widely spaced should be used. Care should

be taken to avoid damaging the surficial root systems of unharvested trees. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the ponding, these soils are generally unsuited to building site development and sanitary facilities. Because of the ponding and the potential for frost action, the soils are severely limited as sites for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to minimize the damage caused by frost action and ponding. Providing coarse grained subgrade or base material helps to prevent the damage caused by frost action.

The land capability classification is IVw. The woodland ordination symbol is 2W.

Ad—Adrian muck, drained. This very deep, nearly level, very poorly drained soil is in depressions. It is frequently ponded for brief periods by surface runoff from surrounding soils. Individual areas are oval and range from 5 to 120 acres in size. The dominant size is about 10 acres.

Typically, the surface layer is black muck about 12 inches thick. Below this, to a depth of about 30 inches, is black, friable muck. The substratum to a depth of about 60 inches is gray sand. In some places the muck is more than 50 inches thick. In some areas the muck is underlain by coprogenous earth, marl, and sand. In other areas the muck is less than 16 inches thick. In a few places mineral material from the higher surrounding areas has been washed over the muck.

Included with this soil in mapping are a few small areas of the very poorly drained Granby soils in the slightly higher positions on the landscape. These soils are sandy throughout. They make up about 5 percent of the map unit.

The available water capacity is very high in the Adrian soil. Permeability is moderately slow in the organic layers and rapid in the substratum. The content of organic matter in the surface layer is very high. Runoff is very slow or ponded. This soil has a high water table at or above the surface from late fall through early spring.

Most areas are used for cultivated crops.

This soil is poorly suited to corn and soybeans because of ponding, wetness, and soil blowing. Ponded areas hinder the use of equipment, and machinery bogs down if the soil is wet. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring. The wetness can be reduced by controlling the water table with open ditches, surface drains, and subsurface drains. Pumping can be used in areas where a suitable outlet is not available. The ponded areas can generally be drained with an open inlet pipe in conjunction with subsurface drainage. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Excessive drainage by the subsurface drainage system may cause droughtiness. Droughtiness can be minimized by controlling the water table with open ditches, subsurface drains, water-retention structures, and subsurface irrigation. Drainage systems should be designed so that they keep the water table at the level required by crops during the growing season and raise the water table to the surface during the rest of the year. Such systems minimize oxidation and subsidence of the organic material and reduce the hazard of soil blowing. Because the soil is unstable, caution is needed if heavy equipment is used near open ditches. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. The soil is well suited to the spring plow cropping system.

This soil is fairly well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay. It is well suited to pasture. Soil blowing and ponding are hazards. Frost heaving, excess water, and the subsidence of muck after drainage are additional limitations. Other management concerns are overgrazing and grazing when the soil is too wet. A permanent cover of grasses and legumes helps to control soil blowing. The muck may be unstable. The ponded areas hinder the use of equipment, and machinery bogs down if the soil is wet. Management of the water table determines the rate at which the muck oxidizes. Overdrainage increases this rate. If drainage outlets are provided, excess water can be removed by surface drains, subsurface drains, pumping, or a combination of these practices. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Drainage helps to control the stability of the muck. Overgrazing reduces plant density and hardiness. Grazing during wet periods reduces forage yields, damages the sod, and reduces plant density and hardiness. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted legumes. Proper stocking rates, timely deferment of grazing, and restricted use during wet periods maintain good plant density and hardiness and help to keep

the pasture in good condition.

This soil is poorly suited to trees. The main management concerns are equipment limitations, seedling mortality, the windthrow hazard, and plant competition. The equipment limitations can be overcome by delaying timber harvest until dry periods or until the soil is frozen. Planting more trees than is necessary can help to overcome seedling mortality, but thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Selecting water-tolerant species helps to overcome the windthrow hazard. Harvest methods that do not leave the remaining trees widely spaced or isolated should be used. Care should be taken to avoid damaging the surficial root systems of unharvested trees. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by cutting, spraying, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the ponding, this soil is generally unsuited to building site development and sanitary facilities. Because of subsidence, the ponding, and the potential for frost action, the soil is severely limited as a site for local roads and streets. Maintaining a crown in roads, removing the unstable material and constructing the roads on raised, well compacted fill material, and providing adequate side ditches and culverts help to minimize the damage caused by frost action and ponding. Removing the organic material and providing coarse grained subgrade or base material help to prevent the damage caused by subsidence and frost action.

The land capability classification is IVw. The woodland ordination symbol is 2W.

Af—Adrian Variant muck, drained. This very deep, nearly level, very poorly drained soil is in broad depressional areas. It is frequently ponded for brief periods by surface runoff from surrounding soils. Individual areas are broad and irregularly shaped and range from 20 to 150 acres in size. The dominant size is about 40 acres.

Typically, the surface layer is black muck about 11 inches thick. The substratum to a depth of about 60 inches is dark gray and pale brown, mottled sand. In places the substratum is loamy material. In a few areas coprogenous earth is in the upper part of the substratum. In a few places the muck is more than 16 inches thick. Some areas have marl at or near the surface over coprogenous earth and sand.

Included with this soil in mapping are some small areas of the very poorly drained Houghton soils in the slightly lower positions. These soils formed in more than 51 inches of muck. They make up about 2 percent of the map unit.

The available water capacity is moderate in the Adrian Variant soil. Permeability is moderately slow in the organic material and rapid in the substratum. The content of organic matter in the surface layer is very high. Runoff is very slow or ponded. This soil has a high water table at or above the surface from late fall through early spring.

Most areas are used for cultivated crops.

This soil is poorly suited to corn and soybeans because of ponding, wetness, and soil blowing. Ponded areas hinder the use of equipment, and machinery bogs down if the soil is wet. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring. The wetness can be reduced by controlling the water table with open ditches, surface drains, and subsurface drains. Pumping can be used in areas where a suitable outlet is not available. The ponded areas can generally be drained with an open inlet pipe in conjunction with subsurface drainage. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Excessive drainage by the subsurface drainage system may cause droughtiness. Droughtiness can be minimized by controlling the water table with open ditches, subsurface drains, water-retention structures, and subsurface irrigation. Drainage systems should be designed so that they keep the water table at the level required by crops during the growing season and raise the water table to the surface during the rest of the year. Such systems minimize oxidation and subsidence of the organic material and reduce the hazard of soil blowing. Because the soil is unstable, caution is needed if heavy equipment is used near ditches. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. This soil is well suited to the spring plow cropping system.

This soil is fairly well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay. It is well suited to pasture. Soil blowing and ponding are hazards. Frost heaving, excess water, and the subsiding of muck after drainage are additional limitations. Other management concerns are overgrazing and grazing when the soil is too wet. A permanent cover of grasses and legumes helps to control soil blowing. The muck may be unstable. The

ponded areas hinder the use of equipment, and machinery bogs down if the soil is wet. Management of the water table determines the rate at which the muck oxidizes. Overdrainage increases this rate. If drainage outlets are provided, excess water can be removed by surface drains, subsurface drains, pumping, or a combination of these practices. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Drainage helps to control the stability of the muck. Overgrazing reduces plant density and hardiness. Grazing during wet periods reduces forage yields, damages the sod, and reduces plant density and hardiness. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted legumes. Proper stocking rates, timely deferment of grazing, and restricted use during wet periods maintain good plant density and hardiness and help to keep the pasture in good condition.

This soil is poorly suited to trees. The main management concerns are equipment limitations, seedling mortality, the windthrow hazard, and plant competition. The equipment limitations can be overcome by delaying timber harvest until dry periods or until the soil is frozen. Planting more trees than is necessary can help to overcome seedling mortality, but thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Selecting water-tolerant species helps to overcome the windthrow hazard. Harvest methods that do not leave the remaining trees isolated or widely spaced should be used. Care should be taken to avoid damaging the surficial root systems of unharvested trees. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by cutting, spraying, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the ponding, this soil is generally unsuited to building site development and sanitary facilities. Because of the ponding and the potential for frost action, the soil is severely limited as a site for local roads and streets. Maintaining a crown in roads, constructing the roads on raised, well compacted fill material, and providing adequate side ditches and culverts help to minimize the damage caused by frost action and ponding. Providing coarse grained subgrade or base material helps to prevent the damage caused by frost action.

The land capability classification is IVw. The woodland ordination symbol is 2W.

Ap—Algansee loamy sand, frequently flooded, undrained. This very deep, nearly level, somewhat poorly drained soil is on slight rises on bottom land. It is frequently flooded for long periods. Individual areas are irregular in shape and range from about 5 to 450 acres in size. The dominant size is about 10 acres.

Typically, the surface layer is dark grayish brown loamy sand about 9 inches thick. The substratum extends to a depth of about 60 inches. In sequence downward, it is pale brown and yellowish brown, mottled loamy fine sand; black and gray, mottled loamy sand; gray, mottled loamy sand that has strata of sandy loam; and gray, mottled sandy loam that has strata of sand. In some areas the content of organic carbon decreases regularly with increasing depth.

Included with this soil in mapping are some small areas of the very poorly drained Craigmile and Prochaska soils. These soils are in the lower positions on the landscape. They make up about 2 percent of the map unit.

The available water capacity is moderate in the Algansee soil. Permeability is rapid. The content of organic matter in the surface layer is moderate. Runoff is slow. This soil has a high water table at a depth of 1 to 2 feet from late fall through early spring.

This soil is dominantly within the boundaries of the LaSalle State Fish and Wildlife Area and is managed for wildlife habitat. It is covered with aquatic and semiaquatic vegetation, such as cattails, rushes, sedges, waterlilies, pondweed, spatterdock, and water-tolerant trees and shrubs. These plants provide cover, nesting areas, and food for ducks, geese, and other birds. Areas of this soil also provide habitat for furbearing animals and other kinds of wildlife.

This soil is generally unsuited to corn, soybeans, and small grain. It is poorly suited to pasture. Flooding and wetness are the main management concerns. Most areas support woodland or native grassland. Installing any type of drainage system for the production of cultivated crops would require major land reclamation efforts.

This soil is well suited to trees. Seedling mortality is the main management concern. Planting more trees than is necessary helps to overcome seedling mortality, but thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Pines, which have a deep taproot system, generally grow well on this soil. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the flooding, this soil is generally

unsuited to building site development and sanitary facilities and is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts reduce the flooding hazard.

The land capability classification is Vw. The woodland ordination symbol is 4S.

Ar—Aquolls, ponded. These very deep, nearly level, very poorly drained soils are in nearly level or slightly depressional areas. They are frequently ponded for long periods by surface runoff from surrounding soils. Individual areas are broad and irregularly shaped. They range from about 20 to 400 acres in size. The dominant size is about 200 acres.

Commonly, the surface soil is black loamy sand. The underlying material is dominantly gray sand that has brown mottles. In some areas more clay is in the upper part of the profile.

Included with these soils in mapping are some small areas of the somewhat poorly drained Morocco and Watseka soils. These included soils are in the slightly higher positions on the landscape. They make up about 3 percent of the map unit.

The available water capacity is low in the Aquolls. Permeability is rapid. The content of organic matter in the surface layer is high. Runoff is very slow or ponded. These soils have a high water table at or above the surface from early fall through late spring.

Most areas are used as wetland wildlife habitat. The soils are frequently covered by backwater from drainageways and from J.C. Murphy Lake. They are covered with aquatic and semiaquatic vegetation, such as cattails, rushes, sedges, waterlilies, pondweed, duckweed, and water-tolerant trees and shrubs. These plants provide cover, nesting, and food for many aquatic animals, including ducks, geese, and other birds. Areas of these soils also provide food and cover for wildlife, such as deer, fox, raccoons, and muskrat.

These soils are generally unsuited to corn, soybeans, and small grain and to hay and pasture. Ponding and wetness are the main management concerns. Downstream reclamation and the lowering of J.C. Murphy Lake would be required before these areas could be adequately drained for cultivated crops.

Because of the ponding, these soils are generally unsuited to building site development and sanitary facilities and are severely limited as sites for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to overcome the ponding.

The land capability classification is VIIIw. No woodland ordination symbol is assigned.

AuA—Aubbeenaubbee-Whitaker complex, 0 to 2 percent slopes. This map unit consists of very deep, nearly level, somewhat poorly drained soils on slightly convex rises. The Aubbeenaubbee soil is on summits and the upper side slopes. Individual areas of this unit are irregularly shaped. They are about 45 percent Aubbeenaubbee soil and 30 percent Whitaker soil. They range from 3 to 300 acres in size, but the dominant size is about 70 acres. The Aubbeenaubbee and Whitaker soils occur as areas so intricately mixed or so small that it is not practical to separate them in mapping.

Typically, the surface layer of the Aubbeenaubbee soil is dark grayish brown fine sandy loam about 9 inches thick. The subsurface layer is brown, mottled fine sandy loam about 8 inches thick. The subsoil is about 26 inches thick. It is grayish brown, mottled, friable fine sandy loam in the upper part and grayish brown, mottled, firm clay loam in the lower part. The substratum to a depth of about 60 inches is brown, mottled loam. In places the surface layer is darker. In some areas the subsoil has more sand throughout. In a few areas the substratum is at a depth of less than 40 inches.

Typically, the surface layer of the Whitaker soil is dark grayish brown fine sandy loam about 9 inches thick. The subsurface layer is brown, mottled fine sandy loam about 7 inches thick. The subsoil is about 33 inches thick. The upper part is grayish brown, mottled, friable clay loam, and the lower part is light brownish gray, mottled, friable clay loam and sandy clay loam. The substratum to a depth of about 60 inches is light olive brown, mottled very fine sandy loam that has strata of loamy sand and silt loam. In places the surface layer is darker. In some areas the lower part of the substratum is loam till. In a few areas the substratum is at a depth of less than 40 inches.

Included with these soils in mapping are some small areas of the well drained Martinsville and moderately well drained Williamstown soils in the more sloping areas. Also included are some areas that have stones as large as 1 foot in diameter on the surface. Included areas make up about 10 percent of the map unit.

The available water capacity is moderate in the Aubbeenaubbee soil and high in the Whitaker soil. Permeability is moderately rapid in the upper part of the solum in the Aubbeenaubbee soil and slow to moderate in the substratum. It is moderate in the upper part of the Whitaker soil and moderate or moderately rapid in the substratum. The content of organic matter in the surface layer is moderately low in both soils. Runoff is slow. These soils have a water table that fluctuates

between depths of 1 and 3 feet from winter through early spring.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

These soils are well suited to corn, soybeans, and small grain. Wetness and soil blowing are the main management concerns. A drainage system helps to lower the water table and raises the temperature of the soils more quickly in the spring. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable in areas of the Whitaker soil, caution is needed if heavy equipment is used near open excavations. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Crop residue management, green manure crops, and cover crops maintain or improve tilth, the rate of water infiltration, aeration, and the content of organic matter. These soils are well suited to the ridge-till cropping system.

These soils are well suited to grasses and legumes, such as orchardgrass and ladino clover, for hay or pasture. Excess water and frost heaving are limitations. Soil blowing is a hazard. Excess water can be removed by surface drains, subsurface drains, or a combination of these practices. A permanent cover of grasses and legumes helps to control soil blowing. Overgrazing and grazing during wet periods are major management concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to prevent surface compaction, maintain good plant density and hardiness, and help to keep the pasture in good condition.

These soils are well suited to trees. Plant competition is moderate. Seedlings survive and grow well if competing vegetation is controlled. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the wetness, these soils are severely limited as sites for dwellings. Adequate surface and subsurface drainage helps to overcome the wetness. Surface drains, foundation drains, and landscaping that removes runoff help to lower the water table. Constructing dwellings on well compacted fill material also helps to overcome the wetness. Because of the potential for frost action, the soils are severely limited as sites for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts reduce the hazard of frost action. Providing coarse grained subgrade or base material helps to prevent the damage caused by frost action. Because of the wetness, the soils are severely limited as sites for septic tank absorption fields. In addition, the restricted permeability is a limitation in areas of the Aubbeenaubbee soil. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the restricted permeability.

The land capability classification is IIw. The woodland ordination symbol is 4A.

AyB—Ayr loamy fine sand, 1 to 4 percent slopes. This very deep, nearly level or gently sloping, well drained soil is on slightly convex rises. Areas are irregularly shaped and range from 3 to 60 acres in size. The dominant size is about 20 acres.

Typically, the surface soil is very dark brown loamy fine sand about 15 inches thick. The subsoil is about 25 inches thick. It is dark yellowish brown, very friable loamy fine sand in the upper part; yellowish brown, very friable loamy sand in the next part; and yellowish brown, friable loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown loam. In places the combined thickness of the sandy upper layers is more than 36 inches or less than 20 inches. In some areas, the surface soil is thinner or the surface layer is lighter in color. In some places the surface layer is fine sandy loam. In a few areas the substratum is stratified with sandy and loamy material. In places the lower part of the solum has more clay.

Included with this soil in mapping are some small areas of the excessively drained Sparta and somewhat poorly drained Ridgeville soils. Sparta soils are in landscape positions similar to those of the Ayr soil. Ridgeville soils are in the lower lying areas. Also included are areas that have slopes of more than 4 percent or less than 1 percent. Included areas make up about 1 percent of the map unit.

The available water capacity is moderate in the Ayr

soil. Permeability is rapid in the upper part of the solum and moderate in the lower part of the solum and in the substratum. The content of organic matter in the surface layer is moderately low. Runoff is slow.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

This soil is fairly well suited to corn, soybeans, and small grain. Droughtiness, soil blowing, and erosion are the main management concerns. Irrigation systems can be used to reduce seasonal crop stress and increase crop yields. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. The hazard of erosion and the runoff rate can be reduced by using conservation practices, such as crop rotations, critical-area plantings, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and a system of conservation tillage that leaves a protective cover of crop residue on the surface. Grassed waterways help to control erosion in drainageways. Cover crops, green manure crops, and crop residue management maintain or improve tilth, the rate of water infiltration, aeration, and the content of organic matter. In areas where hillside seepage occurs, subsurface drains should be installed. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is needed if heavy equipment is used near open excavations. This soil is well suited to no-till farming.

This soil is well suited to grasses and legumes, such as bromegrass and alfalfa, for hay and pasture. Soil blowing, erosion, and runoff are management concerns. Also, insufficient moisture during the summer months can result in droughtiness. Irrigation can reduce droughtiness and helps to control soil blowing. Overgrazing and grazing during wet periods are major management concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor tilth, causes excessive runoff, reduces forage yields, damages the sod, and reduces plant density and hardiness. A permanent cover of grasses and legumes reduces the runoff rate and helps to control erosion and soil blowing. Deep-rooted legumes and drought-tolerant species are best suited in areas of this soil. Proper stocking rates, pasture rotation, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control soil blowing and erosion, minimize surface compaction, maintain good plant density and hardiness, and help to keep the pasture in good condition.

This soil is suitable as a site for dwellings. Because of the potential for frost action, it is moderately limited as a site for local roads and streets. Constructing roads on raised, well compacted fill material and providing adequate side ditches and culverts reduce the hazard of frost action.

Because of poor filtering qualities, this soil is severely limited as a site for septic tank absorption fields. It readily absorbs but does not adequately filter the effluent from septic tanks. The poor filtering capacity may result in the pollution of ground-water supplies. Filling or mounding with a more suitable fill material improves the capacity of the absorption field and helps to overcome the poor filtering capacity.

The land capability classification is IIIe. No woodland ordination symbol is assigned.

AzA—Ayrmount loamy fine sand, 0 to 2 percent slopes. This very deep, nearly level, moderately well drained soil is on slightly convex rises. Individual areas are irregular in shape and range from 20 to 100 acres in size. The dominant size is about 30 acres.

Typically, the surface layer is very dark grayish brown loamy fine sand about 8 inches thick. The subsurface layer is dark brown loamy fine sand about 5 inches thick. The subsoil is about 31 inches thick. The upper part is dark yellowish brown, very friable fine sand and loamy sand; the next part is yellowish brown, friable sandy clay loam; and the lower part is yellowish brown, mottled, friable loam. The substratum to a depth of about 60 inches is yellowish brown, mottled loam. In some places the upper part of the solum is fine sandy loam. In other places the lower part of the solum contains more clay. In some areas the surface soil is lighter colored or is thinner. In a few places the subsoil and substratum are stratified sands and loams. In a few areas the loamy material is at a depth of more than 60 inches.

Included with this soil in mapping are some small areas of the somewhat poorly drained Ridgeville and Watseka soils in the lower lying areas and the excessively drained Sparta soils in the more sloping positions. Also included are a few areas that have slopes of more than 2 percent. Included areas make up about 10 percent of the map unit.

The available water capacity is moderate in the Ayrmount soil. Permeability is rapid in the upper part of the solum and moderate in the lower part of the solum and in the substratum. The content of organic matter in the surface layer is moderately low. Runoff is very slow. This soil has a water table at a depth of 2.5 to 4.0 feet from late fall through spring.

Most areas are used for cultivated crops. A few areas are used for hay, pasture, or woodland.

This soil is fairly well suited to corn, soybeans, and small grain. Droughtiness and soil blowing are the main management concerns. Irrigation systems reduce seasonal crop stress and increase crop yields. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Cover crops, green manure crops, and crop residue management help to maintain the content of organic matter. In areas where hillside seepage occurs, subsurface drains should be installed. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is needed if heavy equipment is used near open excavations. This soil is well suited to no-till farming.

This soil is well suited to grasses and legumes, such as bromegrass and alfalfa, for hay and pasture. Soil blowing is a hazard. Also, insufficient moisture during the summer months can result in droughtiness. Irrigation can reduce droughtiness and helps to control soil blowing. Overgrazing and grazing during wet periods are major management concerns. Overgrazing increases the hazard of soil blowing and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. A permanent cover of grasses and legumes reduces the runoff rate and helps to control erosion and soil blowing. Deep-rooted legumes and drought-tolerant species are best suited. Proper stocking rates, pasture rotation, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control soil blowing, minimize surface compaction, maintain good plant density and hardiness, and help to keep the pasture in good condition.

This soil is suitable as a site for dwellings without basements. Because of the wetness, it is moderately limited as a site for dwellings with basements. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Constructing dwellings on well compacted fill material also helps to overcome the wetness.

Because of the potential for frost action, this soil is moderately limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts reduce the hazard of frost action.

Because of the wetness and poor filtering qualities, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with a more suitable filter material improves the filtering capacity of the absorption field and helps to overcome the wetness and the poor filtering capacity.

The land capability classification is IIIs. No woodland ordination symbol is assigned.

BbA—Barce-Corwin complex, 0 to 2 percent slopes. This map unit consists of very deep, nearly level, moderately well drained soils on slightly convex rises or ridges. The Barce soil is typically on the lower side slopes and foot slopes. The Corwin soil is on summits, shoulder slopes, and the upper side slopes. Individual areas of this unit are irregularly shaped. They are about 50 percent Barce soil and 30 percent Corwin soil. They range from 10 to 80 acres in size. The dominant size is about 20 acres. The Barce and Corwin soils occur as areas so intricately mixed or so small that it is not practical to separate them in mapping.

Typically, the surface soil of the Barce soil is very dark grayish brown silt loam about 11 inches thick. The subsoil is about 37 inches thick. The upper part is dark yellowish brown and dark brown, firm clay loam, and the lower part is olive brown, mottled, firm loam. The substratum to a depth of about 60 inches is olive brown, mottled loam. In a few areas the dark surface layer is thinner. In a few places the upper part of the solum has less clay and more sand. Some areas have silt loam glacial till in the substratum. In other areas the substratum is at a depth of less than 40 inches. In some small, moderately eroded areas, the subsoil is mixed with the lower part of the surface soil. A few areas have slopes of more than 2 percent. In places the substratum is stratified sands and loams above a depth of 60 inches.

Typically, the surface soil of the Corwin soil is very dark gray and very dark grayish brown silt loam about 11 inches thick. The subsoil is about 21 inches thick. The upper part is yellowish brown, firm silty clay loam, and the lower part is yellowish brown, mottled, firm clay loam. The substratum to a depth of about 60 inches is brown, mottled loam. In a few areas, the dark surface layer is thinner or the surface layer is lighter in color. In some small, moderately eroded areas, the subsoil is mixed with the surface layer. In places the substratum is stratified sands and loams. A few areas have slopes of more than 2 percent. In a few places the substratum is at a depth of more than 40 inches.

Included with these soils in mapping are some small areas of the somewhat poorly drained Gilboa and Odell

Figure 7.—Corn grown in a ridge-till cropping system in an area of Barce-Corwin complex, 0 to 2 percent slopes.

soils and the poorly drained Selma soils. These included soils are in the lower positions on the landscape. Also included are some areas that have stones as much as 1 foot in diameter on the surface. Included areas make up about 8 percent of the map unit.

The available water capacity is high in the Barce soil and moderate in the Corwin soil. Permeability is moderate in the upper part of the solum in the Barce soil, moderately slow in the lower part of the solum, and slow in the substratum. It is moderate in the solum of the Corwin soil and slow in the substratum. The content of organic matter in the surface layer of both soils is moderate. Runoff is slow. The Barce soil has a water table at a depth of 3 to 4 feet from early winter through spring. The Corwin soil has a water table at a depth of

2 to 4 feet from winter through spring.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

These soils are well suited to corn, soybeans, and small grain. Cover crops, green manure crops, and crop residue management maintain or improve tilth, the rate of water infiltration, aeration, and the content of organic matter. The soils are well suited to ridge-till and no-till cropping systems (fig. 7).

These soils are well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Overgrazing and grazing during wet periods are the major management concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and help to keep the pasture in good condition.

Because of the shrink-swell potential, these soils are moderately limited as sites for dwellings. In addition, wetness is a severe limitation affecting dwellings with or without basements on the Corwin soil. It is a moderate limitation affecting dwellings with basements on the Barce soil. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Constructing dwellings on elevated, well compacted fill material also helps to overcome the wetness. The construction of foundations, footings, or basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete.

Because of the shrink-swell potential and the potential for frost action, the Barce soil is moderately limited as a site for local roads and streets. Because of wetness, the shrink-swell potential, and low strength, the Corwin soil is moderately limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts can minimize the damage caused by wetness and frost action. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength and by shrinking and swelling of the soil. Replacing or strengthening the upper layer with a more suitable base material improves the ability of the soil to support vehicular traffic.

Because of the wetness and the restricted permeability, these soils are severely limited as sites for septic tank absorption fields. Perimeter drains around the filter field lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the restricted permeability.

The land capability classification is I. No woodland ordination symbol is assigned.

BfB2—Barce-Montmorenci complex, 1 to 4 percent slopes, eroded. This map unit consists of very deep, nearly level to gently sloping, moderately well drained soils on knolls and ridgetops. The Barce soil is typically on the lower side slopes and foot slopes. The Montmorenci soil is on summits, shoulder slopes, and the upper side slopes. Areas of these soils are dominantly irregular in shape and range from 3 to 40 acres in size. The dominant size is about 15 acres. The areas are about 35 percent Barce soil and 35 percent Montmorenci soil. The two soils occur as areas so intricately mixed or so small that it is not practical to separate them in mapping.

Typically, the surface layer of the Barce soil is very dark grayish brown loam mixed with yellowish brown clay loam from the subsoil. It is about 10 inches thick. The subsoil is about 38 inches thick. The upper part is yellowish brown, friable clay loam and sandy clay loam, and the lower part is light olive brown, mottled, firm loam. The substratum to a depth of about 60 inches is light olive brown loam. In a few areas the dark surface layer is thinner. In some places the upper part of the solum has less clay and more sand. In many small areas the solum is less than 40 inches thick. In some places the substratum is stratified sandy and loamy material. In a few areas silt loam glacial till is in the substratum. Some areas have slopes of less than 1 percent or more than 4 percent.

Typically, the surface layer of the Montmorenci soil is very dark grayish brown loam mixed with dark yellowish brown clay loam from the subsoil. It is about 8 inches thick. The subsoil is about 29 inches thick. The upper part is dark yellowish brown, firm clay loam. The lower part is yellowish brown, mottled, firm loam. The substratum to a depth of about 60 inches is yellowish brown, mottled loam. In some places the dark surface layer is thicker. In other places the surface layer is lighter colored. In a few areas the subsoil does not have gray mottles. In places the subsoil has less sand and more silt. A few areas have silt loam glacial till in the substratum. In some small areas the solum is less than 24 inches or more than 40 inches thick. Some areas have slopes of less than 1 percent or more than 4 percent.

Included with these soils in mapping are many small

Figure 8.—No-till corn planted in corn stubble in an area of Barce-Montmorenci complex, 1 to 4 percent slopes, eroded.

areas of the somewhat poorly drained Gilboa and Odell soils and the poorly drained Selma soils in the lower lying areas. Also included are the very poorly drained Peotone soils in depressions. Included soils make up about 8 percent of the map unit.

The available water capacity is moderate in the Barce and Montmorenci soils. Permeability is moderate in the upper part of the solum in the Barce soil, moderately slow in the lower part of the solum, and slow in the substratum. It is moderate in the upper part of the solum in the Montmorenci soil, moderately slow in the lower part of the solum, and very slow or slow in the substratum. The organic matter content in the surface layer of both soils is moderate. Runoff is medium. The Barce soil has a water table at a depth of 3 to 4 feet from winter through spring. The Montmorenci soil has a water table at a depth of 2 to 4 feet from winter through spring.

Most areas are used for cultivated crops. Some small areas are used for hay or pasture.

These soils are well suited to corn, soybeans, and small grain. Erosion is the main management concern. The hazard of erosion can be reduced by water- and sediment-control basins, diversions, terraces, crop rotations, critical-area plantings, a system of conservation tillage that leaves a protective cover of crop residue on the surface, cover crops, green manure crops, or grade-stabilization structures; by a combination of these practices; or by a permanent cover of vegetation. Grassed waterways help to control erosion in drainageways. Using a cropping system that includes close-growing crops helps to control erosion. In areas where hillside seepage occurs, subsurface drains should be installed. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This unit is well suited to no-till and

ridge-till cropping systems (fig. 8).

These soils are well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay or pasture. Controlling runoff and erosion is a management concern. Overgrazing and grazing during wet periods are also concerns. Overgrazing increases the hazard of erosion and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, causes excessive runoff, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes slows runoff and helps to control erosion. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control erosion, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the shrink-swell potential, these soils are moderately limited as sites for dwellings with or without basements. The wetness is an additional limitation affecting dwellings without basements in areas of the Montmorenci soil. On sites for dwellings with basements, the wetness is a moderate limitation in areas of the Barce soil and a severe limitation in areas of the Montmorenci soil. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. The construction of foundations, footings, or basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete. Placing buildings on raised, well compacted fill material helps to overcome the wetness.

Because of the potential for frost action and the shrink-swell potential, the Barce soil is moderately limited as a site for local roads and streets. The Montmorenci soil is severely limited as a site for local roads and streets because of low strength and the shrink-swell potential. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts reduce the hazard of frost action. Providing coarse grained subgrade or base material helps to prevent the damage caused by frost action, low strength, and shrinking and swelling of the soil.

Because of the wetness and the restricted permeability, these soils are severely limited as sites for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the restricted permeability.

The land capability classification is IIe. No woodland ordination symbol is assigned.

Bh—Barry-Gilford complex. This map unit consists of very deep, nearly level, poorly drained and very poorly drained soils in depressional areas. The Barry soil is in drainageways and the lower lying areas. The Gilford soil is on very slight rises and the upper side slopes of drainageways. This unit is frequently ponded for brief periods by surface runoff from surrounding soils. Areas are irregular in shape and range from 3 to more than 500 acres in size. The dominant size is about 100 acres. The areas are about 50 percent Barry soil and 30 percent Gilford soil. The two soils occur as areas so intricately mixed or so small that it is not practical to separate them in mapping.

Typically, the surface layer of the Barry soil is very dark gray fine sandy loam about 12 inches thick. The subsoil is dark gray and gray, mottled, firm loam about 35 inches thick. The substratum to a depth of about 60 inches is grayish brown, mottled loam. In places the surface layer contains more sand. In some areas the solum is more than 50 inches thick. In other areas the lower part of the solum and the substratum are stratified loamy and sandy material. Some areas have less clay in the subsoil. In a few places the subsoil and the substratum have more clay.

Typically, the surface layer of the Gilford soil is very dark gray fine sandy loam about 18 inches thick. The subsoil is dark gray, very friable fine sandy loam about 12 inches thick. The substratum to a depth of about 60 inches is gray loamy sand and sand. In places the subsoil has more clay. In some areas the solum has more sand. In other areas the substratum has loam glacial till. In a few places the substratum contains more gravel.

Included with these soils in mapping are some small areas of the somewhat poorly drained Ridgeville, Seafield, and Sumava soils in the slightly higher positions. Also included are areas of the well drained Octagon soils in the higher positions. Included soils make up about 10 percent of the map unit.

The available water capacity is high in the Barry soil and moderate in the Gilford soil. Permeability is moderate in the solum of the Barry soil and slow in the substratum. It is moderately rapid in the solum of the Gilford soil and rapid in the substratum. The content of organic matter is high in the surface layer of the Barry soil and moderate in the surface layer of the Gilford soil. Runoff is very slow or ponded on both soils. A water table is at or above the surface from late fall through spring.

Most areas are used for cultivated crops. A few

areas are used for hay or pasture.

These soils are well suited to corn, soybeans, and small grain. Wetness, ponding, and soil blowing are the main management concerns. Droughtiness is also a concern in areas of the Gilford soil. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Ponded areas can generally be drained with an open inlet pipe in conjunction with subsurface drainage. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Pumping can be used in areas where a suitable outlet is not available. Excessive drainage by the subsurface drainage system may cause droughtiness in the Gilford soil. Because cutbanks are unstable in areas of the Gilford soil, caution is advised if heavy equipment is used near open excavations. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Irrigation systems reduce seasonal crop stress and increase crop yields. Crop residue management, green manure crops, and cover crops improve or maintain tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. These soils are well suited to the ridge-till cropping system.

These soils are well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Ponding and the hazard of soil blowing are management concerns. Frost heaving and excess wetness are limitations. Overgrazing and gazing during wet periods are also concerns. Water management practices, such as drainage, are needed for high yields of hay and pasture. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Water-tolerant species are best suited to these soils. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

The Barry soil is well suited to trees, and the Gilford soil is fairly well suited. The main management concerns are equipment limitations, seedling mortality, the windthrow hazard, and plant competition. The equipment limitations can be overcome by delaying timber harvest until dry periods or until the soil is frozen. Planting more trees than is necessary helps to overcome seedling mortality, but thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Selecting water-tolerant species helps to overcome the windthrow hazard. Harvest methods that do not leave the remaining trees isolated or widely spaced should be used. Care should be taken to avoid damaging the surficial root systems of unharvested trees. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of ponding, these soils are generally unsuited to use as sites for dwellings or sanitary facilities. Because of the ponding and the potential for frost action, the soils are severely limited as sites for local roads and streets. Maintaining a crown in roads, constructing the roads on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action and ponding. Providing coarse grained subgrade or base material also helps to prevent the damage caused by frost action.

The land capability classification is IIw. The woodland ordination symbol is 5W for the Barry soil and 4W for the Gilford soil.

BmB—Brems loamy sand, 1 to 3 percent slopes. This very deep, nearly level or gently sloping, moderately well drained soil is on slightly convex rises or ridges. Individual areas are irregularly shaped and range from 3 to 80 acres in size. The dominant size is about 10 acres.

Typically, the surface layer is dark brown loamy sand about 7 inches thick. The subsoil is about 29 inches thick. The upper part is dark brown, very friable loamy fine sand; the next part is yellowish brown, very friable loamy sand; and the lower part is yellowish brown, mottled, very friable sand. The substratum extends to a depth of about 60 inches. It is yellowish brown sand in the upper part and yellowish brown, mottled sand in the lower part. In some areas the surface layer is darker and thicker. In many places the gray mottles are not readily visible because of iron stains on the sand

grains. Some areas have slopes of less than 1 percent or more than 3 percent.

Included with this soil in mapping are some small areas of the very poorly drained Maumee and Newton soils and the somewhat poorly drained Morocco and Seafield soils in the lower positions on the landscape. Also included are a few areas of the moderately well drained and well drained Oakville soils in the higher positions. Included soils make up about 10 percent of the map unit.

The available water capacity is low in the Brems soil. Permeability is rapid. The content of organic matter in the surface layer is low. Runoff is slow. This soil has a high water table at a depth of 2 to 3 feet from winter through early spring.

Most areas are used for cultivated crops. Many areas are used as woodland. A few areas are used for specialty crops, hay, or pasture.

This soil is poorly suited to corn, soybeans, and small grain. Droughtiness, soil blowing, and the hazard of erosion are the main management concerns. Irrigation systems can be used to reduce seasonal crop stress and increase crop yields. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. Crop residue management, cover crops, and green manure crops help to maintain or improve the content of organic matter. This soil is well suited to no-till farming.

This soil is fairly well suited to grasses and legumes, such as bromegrass and alfalfa, for hay. It is well suited to pasture. Soil blowing, droughtiness, overgrazing, and grazing during wet periods are major management concerns. Overgrazing increases the hazard of soil blowing and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. A permanent cover of grasses and legumes helps to control soil blowing. Deep-rooted legumes and drought-tolerant species are best suited. Irrigation helps to overcome droughtiness. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control soil blowing, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is well suited to trees. Seedling mortality is the main management concern. Pines, which have a deep taproot system, generally grow well on this soil. Woodland management includes keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of wetness, this soil is moderately limited as a site for dwellings without basements and severely limited as a site for dwellings with basements. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material helps to overcome the wetness.

Because of the wetness, this soil is moderately limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to overcome the wetness.

Because of the wetness and poor filtering qualities, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the poor filtering capacity of the soil.

The land capability classification is IVs. The woodland ordination symbol is 4A.

By—Bryce silty clay loam. This very deep, nearly level, poorly drained soil is in depressions and drainageways. It is frequently ponded for brief periods by surface runoff from surrounding soils. Individual areas are long and irregularly shaped. They range from 4 to 350 acres in size. The dominant size is about 100 acres.

Typically, the surface soil is black silty clay loam about 16 inches thick. The subsoil is dark gray, gray, and grayish brown, mottled, firm and very firm silty clay about 37 inches thick. The substratum to a depth of about 60 inches is light brownish gray, mottled silty clay. In places the solum contains more sand. Some areas have a layer of silt loam overwash from the surrounding higher areas.

Included with this soil in mapping are a few small areas of Simonin, Swygert, and Swygert Variant soils. The moderately well drained Simonin and Swygert Variant soils are in the higher positions on the landscape. The somewhat poorly drained Swygert soils are on low rises. Included soils make up about 9 percent of the map unit.

The available water capacity is moderate in the Bryce soil. Permeability is slow in the upper part of the solum and slow or very slow in the lower part of the solum and in the substratum. The content of organic

matter in the surface layer is high. Runoff is very slow or ponded. The seasonal high water table is at or above the surface from late winter through spring.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness and ponding are the main management concerns. The surface layer is firm. If the soil is tilled when wet, large clods form. The clods become hard when they dry. Because of the cloddiness, preparing a seedbed is difficult. Keeping tillage to a minimum helps to maintain good tilth. Soil tilth may improve if there are several cycles of freezing and thawing during the winter. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring, thus allowing the planting of longer season varieties of adapted crops. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Water management practices, such as drainage, are necessary for high yields of adapted crops. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Pumping can be used in areas where a suitable outlet is not available. In subsurface drainage systems, the tile lines should be spaced close together because of the clayey subsoil. Crop residue management, cover crops, and green manure crops help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to fall plowing and fall chisel cropping systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Ponding is a hazard. Frost heaving and excess water are limitations. Overgrazing and grazing during wet periods are also major management concerns. Water management practices, such as drainage, are necessary for high yields of hay and pasture. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Water-tolerant species are best suited. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of ponding, this soil is generally unsuited to use as a site for dwellings or septic tank absorption fields. Because of the ponding, low strength, and the shrink-swell potential, it is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action and ponding. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength and by shrinking and swelling of the soil.

The land capability classification is IIw. No woodland ordination symbol is assigned.

Co—Comfrey loam, frequently flooded, undrained. This very deep, nearly level, very poorly drained soil is in low lying areas on bottom land and in old stream channels. It is frequently flooded for brief or long periods. Individual areas are long and narrow and range from 5 to 70 acres in size. The dominant size is about 50 acres.

Typically, the surface soil is very dark gray and black loam about 31 inches thick. The subsoil is gray, mottled, friable loam about 13 inches thick. The substratum to a depth of about 60 inches is gray, mottled loam. In places the soil contains less clay throughout. Some areas have a dark surface soil more than 36 or less than 24 inches thick. In a few areas the solum contains more silt and less sand.

Included with this soil in mapping are a few small areas of the well drained Miami soils in the higher positions on the landscape. These soils make up about 2 percent of the map unit.

The available water capacity is high in the Comfrey soil. Permeability is moderate. The content of organic matter in the surface layer is high. Runoff is very slow. The seasonal high water table is at or near the surface from late winter through spring.

Most areas are used as unimproved pasture or woodland. Pastured areas consist of water-tolerant grasses. Woodlots support water-tolerant trees, such as eastern cottonwood, pin oak, sycamore, and willow. A few small areas are used for cultivated crops or hay.

This soil is generally unsuited to corn, soybeans, and small grain. Frequent flooding and equipment limitations are the main management concerns. Most areas are too narrow for drainage systems or flood protection.

This soil is well suited to wetland wildlife habitat. It is frequently flooded by backwater from adjacent streams and drainageways. Areas of this soil are covered with aquatic and semiaquatic vegetation, such as cattails, rushes, sedges, waterlilies, pondweed, duckweed, spatterdock, and water-tolerant trees and shrubs. These plants provide cover, nesting, and food for many aquatic animals, including ducks, geese, and other birds. Areas of this soil also provide food and cover for wildlife, such as deer, fox, raccoons, and muskrat.

This soil is generally unsuited to grasses and legumes for hay. It is poorly suited to pasture. If used for pasture, reed canarygrass and ladino clover are best suited. Flooding and excess water are management concerns. Frost heaving is a limitation. Overgrazing and grazing during wet periods are also management concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Water-tolerant species are best suited. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the flooding, this soil is generally unsuited to use as a site for dwellings or septic tank absorption fields. Because of low strength, wetness, and flooding, it is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to control the flooding and wetness. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength.

The land capability classification is Vw. No woodland ordination symbol is assigned.

Cr—Conrad loamy fine sand. This very deep, nearly level, very poorly drained soil is in nearly level or depressional areas. It is frequently ponded for brief periods by surface runoff from surrounding soils. Individual areas are broad and irregularly shaped and range from 300 to 1,000 acres in size. The dominant size is about 400 acres.

Typically, the surface layer is very dark gray loamy fine sand about 8 inches thick. The substratum extends to a depth of about 60 inches. It is light brownish gray, mottled fine sand in the upper part; light yellowish brown, mottled fine sand in the next part; and pale brown and brown sand in the lower part. In a few places the dark surface soil is thicker. In some places the upper part of the profile is more acid or has iron accumulations.

Included with this soil in mapping are some small areas of the somewhat poorly drained Tedrow and Zaborosky soils. These soils are in the slightly higher positions on the landscape. They make up about 5 percent of the map unit.

The available water capacity is low in the Conrad soil. Permeability is rapid. The content of organic matter in the surface layer is moderate. Runoff is very slow or ponded. The seasonal high water table is at or above the surface from late fall through spring.

Most areas are used for cultivated crops.

This soil is fairly well suited to corn, soybeans, and small grain. Wetness, ponding, soil blowing, and droughtiness are the main management concerns. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring, thus allowing the planting of longer season varieties of adapted crops. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Pumping can be used in areas where a suitable outlet is not available. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Excessive drainage by the subsurface drainage system can cause droughtiness. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Irrigation systems can reduce seasonal crop stress and increase crop yields. Droughtiness can be minimized by controlling the water table with subsurface irrigation. Crop residue management, cover crops, and green manure crops help to maintain or improve tilth and the content of organic matter. This soil is well suited to the ridge-till cropping system.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Soil blowing, droughtiness, and ponding are hazards. Frost heaving and excess water are limitations. Water management practices, such as drainage and irrigation, are necessary for high yields of hay and pasture. Overgrazing and grazing during wet periods are also major management concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Water-tolerant species are best suited to this soil. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the ponding, this soil is generally

unsuited to use as a site for dwellings or septic tank absorption fields and is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to overcome the ponding.

The land capability classification is IIIw. No woodland ordination symbol is assigned.

CtA—Corwin fine sandy loam, 0 to 2 percent slopes. This very deep, nearly level, moderately well drained soil is on the summits of slightly convex rises or ridges. Individual areas are irregularly shaped and range from 10 to 80 acres in size. The dominant size is about 20 acres.

Typically, the surface soil is very dark gray and very dark grayish brown fine sandy loam about 12 inches thick. The subsoil is about 28 inches thick. The upper part is dark yellowish brown and yellowish brown, friable clay loam; the next part is yellowish brown, mottled, friable clay loam; and the lower part is brown, mottled loam. The substratum to a depth of about 60 inches is brown, mottled loam. In a few areas, the dark surface layer is thinner or the surface layer is lighter in color. In a few places the substratum is stratified sands and loams. Some areas have slopes of more than 2 percent. In a few places the depth to the underlying material is more than 40 inches. In some small moderately eroded areas, the subsoil is mixed with the surface layer. In places the upper part of the solum has more sand.

Included with this soil in mapping are some small areas of Barce and Odell soils. The moderately well drained Barce soils have more sand in the upper part of the subsoil than the Corwin soil. They are in the less sloping areas. The somewhat poorly drained Odell soils are slightly lower on the landscape than the Corwin soil. Included soils make up about 5 percent of the map unit.

The available water capacity is high in the Corwin soil. Permeability is moderate. The content of organic matter in the surface layer is moderate. Runoff is slow. The seasonal high water table is at a depth of 2 to 4 feet from early winter through early spring.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Soil blowing is the main management concern. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Crop residue management, cover crops, and green manure crops help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to ridge-till and no-till cropping systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Soil blowing is a hazard. Overgrazing and grazing during wet periods are also major management concerns. Overgrazing increases the hazard of soil blowing and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Deep-rooted legumes and drought-tolerant species are best suited to this soil. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control soil blowing, reduce surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is not rated for timber production. Most trees in areas of this soil are planted in windbreaks.

Because of wetness and the shrink-swell potential, this soil is moderately limited as a site for dwellings without basements. It is severely limited as a site for dwellings with basements because of the wetness. Adequate surface and subsurface drainage helps to overcome the wetness. Foundation drains and landscaping that removes runoff lower the water table and also help to overcome the wetness. The construction of foundations, footings, and basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete.

Because of low strength, wetness, and the shrink-swell potential, this soil is moderately limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to overcome the wetness. Providing coarse grained subgrade or base material helps to prevent the damage caused by shrinking and swelling and by low strength.

Because of the wetness, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness.

The land capability classification is I. No woodland ordination symbol is assigned.

CtB2—Corwin fine sandy loam, 2 to 6 percent slopes, eroded. This very deep, gently sloping, moderately well drained soil is on slightly convex rises or ridges. Individual areas are irregularly shaped and range from 10 to 80 acres in size. The dominant size is about 20 acres.

Typically, the surface layer is about 10 inches thick. It is very dark grayish brown fine sandy loam mixed with dark yellowish brown loam from the subsoil. The subsoil is about 30 inches thick. The upper part is dark yellowish brown, friable loam; the next part is yellowish brown, firm clay loam; and the lower part is brown, mottled, firm loam. The substratum to a depth of about 60 inches is brown, mottled loam. In a few places, the dark surface layer is thinner or the surface layer is lighter in color. In a few areas more sand is in the upper part of the solum. In some places the substratum is stratified sands and loams. Some areas have slopes of less than 2 percent or more than 6 percent and are more eroded. In a few places the solum is more than 40 inches thick.

Included with this soil in mapping are a few small areas of Barce and Odell soils. The moderately well drained Barce soils have more sand in the upper part of the subsoil than the Corwin soil. They are in the less sloping areas. The somewhat poorly drained Odell soils are in the slightly lower positions on the landscape. Also included are areas that have stones on the surface. The stones are as much as 1 foot in diameter. Included areas make up about 8 percent of the map unit.

The available water capacity is high in the Corwin soil. Permeability is moderate. The content of organic matter in the surface layer is moderate. Runoff is medium. The seasonal high water table is at a depth of 2 to 4 feet from early winter through early spring.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Erosion and soil blowing are the main management concerns. Erosion and surface runoff can be controlled by using conservation practices, such as crop rotation, critical-area plantings, terraces, diversions, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and conservation tillage systems that leave a protective cover of crop residue on the surface. Grassed waterways help to control erosion in drainageways. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. In areas where hillside seepage occurs, subsurface drains should be installed. This soil is well suited to ridge-till and no-till cropping systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Soil blowing, runoff, and erosion are management concerns. Overgrazing and grazing when the soil is too wet are also concerns. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes reduces the runoff rate and helps to control soil blowing and erosion. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control erosion and soil blowing, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of wetness and the shrink-swell potential, this soil is moderately limited as a site for dwellings without basements. It is severely limited as a site for dwellings with basements because of the wetness. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. The construction of foundations, footings, or basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete.

Because of the wetness, the shrink-swell potential, and low strength, this soil is moderately limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to overcome the wetness. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength and by shrinking and swelling of the soil.

Because of the wetness, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness.

The land capability classification is IIe. No woodland ordination symbol is assigned.

Cv—Craigmile sandy loam, frequently flooded. This very deep, nearly level, very poorly drained soil is in broad depressions on bottom land. It is frequently flooded and frequently ponded for brief to very long periods. Individual areas are irregularly shaped and range from 10 to 600 acres in size. The dominant size is about 100 acres.

Typically, the surface soil is black sandy loam about 14 inches thick. The substratum extends to a depth of about 60 inches. It is grayish brown, mottled sandy loam in the upper part; dark gray, gray, and light brownish gray, mottled sandy loam in the next part; and light brownish gray, light gray, and dark yellowish brown, mottled sand in the lower part. In places the soil has more clay throughout. In a few areas it has less clay in the upper part of the profile. In some places the upper part of the subsoil is not characterized by an irregular decrease in organic carbon.

Included with this soil in mapping are some small areas of the somewhat poorly drained Algansee soils. These soils are in the slightly higher positions on the landscape. They make up about 4 percent of the map unit.

The available water capacity is moderate in the Craigmile soil. Permeability is moderately rapid in the loamy material and rapid in the sandy material. The content of organic matter in the surface layer is very high. Runoff is very slow or ponded. The seasonal high water table is at or above the surface from fall through spring.

Most areas are used for cultivated crops.

This soil is fairly well suited to corn and soybeans. Wetness, ponding, flooding, and soil blowing are the main management concerns. Small grain planted in the fall is subject to severe damage during periods of prolonged ponding and flooding. Planting short-season varieties of adapted crops in late spring helps to minimize damage or loss caused by ponding and flooding. Some areas can be protected from flooding by constructing dikes and levees. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Pumping can be used in areas where a suitable outlet is not available. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open ditches. Drained areas are frequently droughty during the summer months. Water management practices, such as controlled drainage and subsurface irrigation, can be used to minimize the effects of droughtiness and increase crop yields. Soil blowing can be minimized by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Ponding, soil blowing, and flooding are hazards. Frost heaving and excess water are additional concerns. Water management practices, such as drainage, are necessary for high yields of hay and pasture. Some areas can be protected from flooding by dikes and levees. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. A permanent cover of grasses and legumes helps to control soil slowing. Water-tolerant species are best suited to this soil. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted legumes. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is poorly suited to trees. The main management concerns are equipment limitations, seedling mortality, the windthrow hazard, and plant competition. The equipment limitations can be overcome by delaying timber harvest until dry periods or until the soil is frozen. Planting more trees than is necessary helps to overcome seedling mortality, but thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Selecting water-tolerant species helps to overcome the windthrow hazard. Harvest methods that do not leave the remaining trees isolated or widely spaced should be used. Care should be taken to avoid damaging the surficial root systems of unharvested trees. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, and girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the flooding and the ponding, this soil is generally unsuited to use as a site for dwellings or

septic tank absorption fields. Because of the flooding, the ponding, and the potential for frost action, the soil is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on well compacted fill material raised above flood levels, and providing adequate side ditches and culverts help to prevent the damage caused by frost action, flooding, and ponding. Providing coarse grained subgrade or base material helps to prevent frost damage.

The land capability classification is IIIw. The woodland ordination symbol is 3W.

Cz—Craigmile mucky silt loam, frequently flooded, undrained. This very deep, nearly level, very poorly drained soil is in broad depressions on bottom land. It is frequently flooded for brief to very long periods and is frequently ponded for very long periods. Individual areas are broad and irregularly shaped and range from 20 to 200 acres in size. The dominant size is about 80 acres.

Typically, the surface soil is about 10 inches thick. It is very dark brown mucky silt loam in the upper part and very dark gray loam in the lower part. The substratum extends to a depth of about 60 inches. In sequence downward, it is dark gray, mottled fine sandy loam; dark yellowish brown, mottled loamy fine sand; dark gray and brown, mottled fine sand; and strong brown sand. In places the soil has more clay throughout. In a few areas it has less clay in the upper part of the profile.

Included with this soil in mapping are a few small areas of the somewhat poorly drained Algansee soils. These soils are in the slightly higher positions on the landscape. They make up about 2 percent of the map unit.

The available water capacity is moderate in the Craigmile soil. Permeability is moderately rapid in the loamy material and rapid in the sandy material. The content of organic matter in the surface layer is very high. Surface runoff is very slow or ponded. The seasonal high water table is at or above the surface from fall through spring.

Most areas are used as wetland wildlife habitat. They are covered with aquatic and semiaquatic vegetation, such as cattails, rushes, sedges, waterlilies, pondweed, duckweed, spatterdock, and water-tolerant trees and shrubs. These plants provide cover, nesting areas, and food for ducks, geese, and other birds. Areas of this soil also provide habitat for furbearing animals and other kinds of wildlife. These areas are flooded manually for very long periods. The flooding provides wetland habitat.

This soil is generally unsuited to corn, soybeans, small grain, and hay and is poorly suited to pasture. Wetness, ponding, and flooding are the main management concerns.

Areas of this soil are dominantly woodland. This soil is poorly suited to trees. The main management concerns are equipment limitations, seedling mortality, the windthrow hazard, and plant competition. The equipment limitations can be overcome by delaying timber harvest until dry periods or until the soil is frozen. Planting more trees than is necessary helps to overcome seedling mortality, but thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Selecting water-tolerant species helps to overcome the windthrow hazard. Harvest methods that do not leave the remaining trees isolated or widely spaced should be used. Care should be taken to avoid damaging the surficial root systems of unharvested trees. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the flooding and the ponding, this soil is generally unsuited to use as a site for dwellings or septic tank absorption fields. Because of the flooding, the ponding, and the potential for frost action, the soil is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on well compacted fill material raised above flood levels, and providing adequate side ditches and culverts help to prevent the damage caused by frost action, flooding, and ponding. Providing coarse grained subgrade or base material helps to prevent frost damage.

The land capability classification is Vw. The woodland ordination symbol is 3W.

DaA—Darroch fine sandy loam, 0 to 2 percent slopes. This very deep, nearly level, somewhat poorly drained soil is on slightly convex rises. Individual areas are irregularly shaped and range from 5 to 60 acres in size. The dominant size is about 15 acres.

Typically, the surface soil is very dark gray fine sandy loam about 13 inches thick. The subsoil is about 23 inches thick. The upper part is brown, mottled, firm clay loam, and the lower part is yellowish brown, mottled, friable loam. The substratum to a depth of 60 inches or more is grayish brown silt loam that has strata of very fine sand and loamy sand. In places the substratum contains more clay and less sand. In a few

areas the substratum is not stratified and is firm silt loam. In a few places the surface soil contains more sand. In a few areas the solum is more than 40 inches thick.

Included with this soil in mapping are some small areas of the poorly drained Selma soils. These soils are lower on the landscape than the Darroch soil. Also included are areas of the moderately well drained Elston Variant, Foresman, and Glenhall soils in the higher positions on the landscape. Included soils make up about 10 percent of the map unit.

The available water capacity is high in the Darroch soil. Permeability is moderately slow. The content of organic matter in the surface layer is moderate. Runoff is slow. The seasonal high water table is at a depth of 1 to 3 feet from winter through spring.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness and soil blowing are the main management concerns. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring. The wetness can be reduced by controlling the water table with open ditches, surface drains, and subsurface drains. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to the ridge-till cropping system.

This soil is well suited to grasses and legumes, such as orchardgrass and ladino clover, for hay and pasture. Soil blowing is a hazard. Excess water and frost heaving are also management concerns. The excess water can be removed by surface drains, subsurface drains, or a combination of these practices. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the wetness, this soil is severely limited as a site for dwellings. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness.

Because of the potential for frost action, this soil is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action. Providing coarse grained subgrade or base material also helps to prevent the damage caused by frost action.

Because of the wetness and the restricted permeability, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the restricted permeability.

The land capability classification is IIw. No woodland ordination symbol is assigned.

DcA—Darroch silt loam, 0 to 2 percent slopes. This very deep, nearly level, somewhat poorly drained soil is on slightly convex rises. Individual areas are irregularly shaped and range from 5 to 200 acres in size. The dominant size is about 25 acres.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsurface layer is very dark gray silt loam about 4 inches thick. The subsoil is about 20 inches thick. The upper part is dark brown, mottled silty clay loam, and the lower part is yellowish brown, mottled clay loam and loam. The substratum to a depth of about 60 inches is light yellowish brown, mottled silt loam that has strata of fine sand and fine sandy loam. In places the substratum contains more clay and less sand. In some areas loam material is in the lower part of the substratum. In a few areas the solum is more than 40 inches thick. In a few places the substratum is not stratified and is firm silt loam.

Included with this soil in mapping are some small areas of the poorly drained Selma soils. These soils are in the lower positions on the landscape. Also included are areas of the moderately well drained Elston Variant, Foresman, and Glenhall soils in the higher positions on

the landscape. Included soils make up about 10 percent of the map unit.

The available water capacity is high in the Darroch soil. Permeability is moderately slow. The content of organic matter in the surface layer is moderate. Runoff is slow. The seasonal high water table is at a depth of 1 to 3 feet from winter through spring.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness is the main management concern. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring. The wetness can be reduced by controlling the water table with open ditches, surface drains, and subsurface drains. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to fall chisel and ridge-till cropping systems.

This soil is well suited to grasses and legumes, such as orchardgrass and ladino clover, for hay and pasture. Excess water and frost heaving are limitations. The excess water can be removed by surface drains, subsurface drains, or a combination of these practices. Overgrazing and grazing during wet periods are major management concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the wetness, this soil is severely limited as a site for dwellings. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness.

Because of the potential for frost action, this soil is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action. Providing coarse grained subgrade or base material also helps to prevent frost damage.

Because of the wetness and the restricted permeability, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the restricted permeability.

The land capability classification is IIw. No woodland ordination symbol is assigned.

DdA—Darroch fine sandy loam, sandy substratum, 0 to 2 percent slopes. This very deep, nearly level, somewhat poorly drained soil is on slightly convex rises. Individual areas are irregularly shaped and range from 5 to 100 acres in size. The dominant size is about 15 acres.

Typically, the surface layer is very dark gray fine sandy loam about 10 inches thick. The subsoil is about 25 inches thick. The upper part is dark brown, friable clay loam; the next part is brown, mottled, firm clay loam; and the lower part is light brownish gray, mottled, friable sandy clay loam. The substratum extends to a depth of about 60 inches. The upper part is pale brown, mottled sand that has strata of loamy sand. The lower part is yellowish brown sand. In places the substratum is firm loam throughout. In some areas the dark surface layer is thinner. In a few other areas the surface layer is light colored. In a few places the solum is more than 40 inches thick. In some areas the surface layer contains more sand.

Included with this soil in mapping are a few small areas of the poorly drained Selma soils that have a sandy substratum. These soils are lower on the landscape than the Darroch soil. Also included are small areas of the moderately well drained Elston Variant soils in the higher positions on the landscape. Included soils make up about 5 percent of the map unit.

The available water capacity is moderate in the Darroch soil. Permeability is moderate in the solum and rapid in the substratum. The content of organic matter in the surface layer is moderate. Runoff is slow. The seasonal high water table is at a depth of 1 to 3 feet from late fall through spring.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness and soil blowing are the main management concerns. A drainage system lowers the water table and raises the temperature of the soil more quickly in the spring. The wetness can be reduced by controlling the water table with open ditches, surface drains, and subsurface drains. Using a finely meshed

filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to the ridge-till cropping system.

This soil is well suited to grasses and legumes, such as orchardgrass and ladino clover, for hay or pasture. Soil blowing is a hazard. Excess water and frost heaving are limitations. The excess water can be removed by surface drains, subsurface drains, or a combination of these practices. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Overgrazing and grazing during wet periods are major management concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the wetness, this soil is severely limited as a site for dwellings. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness.

Because of the potential for frost action, this soil is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action. Providing coarse grained subgrade or base material also helps to prevent the damage caused by frost action.

Because of the wetness, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness.

The land capability classification is IIw. No woodland ordination symbol is assigned.

DgA—Darroch loam, till substratum, 0 to 2 percent slopes. This very deep, nearly level, somewhat poorly drained soil is on slightly convex rises. Individual areas are irregularly shaped and range from 3 to 300 acres in size. The dominant size is about 70 acres.

Typically, the surface layer is very dark gray loam about 10 inches thick. The subsoil is friable clay loam about 23 inches thick. The upper part is dark grayish brown, the next part is brown and is mottled, and the lower part is yellowish brown and is mottled. The substratum extends to a depth of about 60 inches. The upper part is brown silt loam that has strata of loamy sand and sandy loam. The lower part is yellowish brown loam. In a few places the substratum contains more clay and less sand throughout. In some areas, the solum is more than 40 inches thick and the depth to loam till is more than 60 inches.

Included with this soil in mapping are some small areas of the poorly drained Selma soils that have a till substratum. These soils are lower on the landscape than the Darroch soil. Also included are a few areas of the moderately well drained Foresman soils that have a till substratum. These soils are in the higher lying areas. Included soils make up about 10 percent of the map unit.

The available water capacity is moderate in the Darroch soil. Permeability is moderately slow in the solum and in the upper part of the substratum and very slow in the lower part of the substratum. The content of organic matter in the surface layer is moderate. Runoff is slow. The seasonal high water table is at a depth of 1 to 3 feet from winter through early spring.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness is the main management concern. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. Crop residue management, cover crops, and green manure crops help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to fall

chisel and ridge-till cropping systems.

This soil is well suited to grasses and legumes, such as orchardgrass and ladino clover, for hay and pasture. Excess water and frost heaving are limitations. The excess water can be removed by surface drains, subsurface drains, or a combination of these practices. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the wetness, this soil is severely limited as a site for dwellings. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness.

Because of low strength and the potential for frost action, this soil is severely limited as a site for local roads and streets. Providing coarse grained subgrade or base material helps to prevent the damage caused by frost action and low strength. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action.

Because of the wetness and the restricted permeability, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the restricted permeability.

The land capability classification is IIw. No woodland ordination symbol is assigned.

EsB—Elston Variant fine sandy loam, 1 to 3 percent slopes. This very deep, nearly level to gently sloping, moderately well drained soil is on convex ridges or knolls. Individual areas are irregularly shaped and range from 10 to 100 acres in size. The dominant size is about 15 acres.

Typically, the surface layer is very dark grayish brown fine sandy loam about 10 inches thick. The subsoil is about 31 inches thick. It is dark yellowish brown and yellowish brown, friable fine sandy loam in the upper part; strong brown, mottled, friable loamy sand in the next part; and yellowish brown, mottled, very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is strong brown and yellowish brown, mottled sand. In some areas, the lower part of the subsoil contains more clay and the substratum is stratified. In places, the upper part of the solum has more sand and the surface layer is light colored. A few areas have slopes of more than 3 percent or less than 1 percent. In some moderately eroded areas, the subsoil is mixed with the surface layer.

Included with this soil in mapping are a few small areas of the somewhat poorly drained Darroch soils that have a sandy substratum. These soils are slightly lower on the landscape than the Elston Variant soil. They make up about 4 percent of the map unit.

The available water capacity is moderate in the Elston Variant soil. Permeability is moderately rapid in the upper part of the solum and rapid in the lower part of the solum and in the substratum. The content of organic matter in the surface layer is moderate. Runoff is medium. The seasonal high water table is at a depth of 2.5 to 4.0 feet from late fall through spring.

Most areas are used for cultivated crops.

This soil is well suited to corn, soybeans, and small grain. Droughtiness, soil blowing, and erosion are the main management concerns. Irrigation systems reduce seasonal crop stress and increase crop yields. Erosion and surface runoff can be controlled by using conservation practices, such as crop rotation, critical-area plantings, terraces, diversions, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and conservation tillage systems that leave all or part of the crop residue on the surface. Grassed waterways help to control erosion in drainageways. In areas where hillside seepage occurs, subsurface drains should be installed. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to ridge-till and no-till cropping systems.

This soil is well suited to grasses and legumes, such as bromegrass and alfalfa, for hay or pasture. Soil

blowing, droughtiness, erosion, and runoff are hazards. Overgrazing and grazing during wet periods are management concerns. Overgrazing increases the hazard of soil blowing and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, causes excess runoff, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes slows runoff and helps to control erosion and soil blowing. Deep-rooted legumes and drought-tolerant species are best suited to this soil. Irrigation helps to overcome droughtiness. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control soil blowing and erosion, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is suitable as a site for dwellings without basements. It is moderately limited as a site for dwellings with basements because of the wetness. Adequate subsurface drainage helps to overcome the wetness. Foundation drains and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness.

Because of the potential for frost action, this soil is moderately limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action. Providing coarse grained subgrade or base material helps to prevent frost damage.

Because of the wetness and poor filtering qualities, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. The soil readily absorbs but does not adequately filter the effluent from septic tanks. The poor filtering capacity may result in the pollution of ground water. Filling or mounding with a better filtering material increases the filtering capacity of the absorption field and helps to overcome the wetness and the poor filtering capacity.

The land capability classification is IIe. No woodland ordination symbol is assigned.

FeA—Foresman fine sandy loam, 0 to 2 percent slopes. This very deep, nearly level, moderately well drained soil is on convex rises. Individual areas are elongated and irregularly shaped. They range from 5 to 40 acres in size. The dominant size is about 20 acres.

Typically, the surface soil is dark brown fine sandy loam about 12 inches thick. The subsoil is yellowish brown, firm clay loam about 27 inches thick. It is mottled in the lower part. The substratum to a depth of about 60 inches is yellowish brown, mottled silt loam that has strata of very fine sand and loamy sand. In some areas the surface layer and the subsoil contain more sand. In places the surface soil is thinner. In a few areas the substratum is not stratified and is firm silt loam. In some places the surface soil contains more sand. Some areas have slopes of more than 2 percent and are moderately eroded. In some places the solum is more than 40 inches thick.

Included with this soil in mapping are a few small areas of the somewhat poorly drained Darroch and poorly drained Selma soils. Darroch soils are slightly lower on the landscape than the Foresman soil. Selma soils are on the lowest parts of the landscape. Included soils make up about 10 percent of the map unit.

The available water capacity is high in the Foresman soil. Permeability is moderate in the solum and moderately slow in the substratum. The content of organic matter in the surface layer is moderate. Runoff is slow. The seasonal high water table is at a depth of 3 to 6 feet from late fall through spring.

Most areas are used for cultivated crops. A few areas are used for pasture, hay, or woodland.

This soil is well suited to corn, soybeans, and small grain. Soil blowing is the main management concern. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. This soil is well suited to ridge-till and no-till cropping systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Soil blowing is a hazard. Overgrazing and grazing during wet periods are also major concerns. Overgrazing increases the hazard of soil blowing and reduces plant density and hardiness. Grazing during wet periods causes surface compaction and poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing

help to control erosion, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the shrink-swell potential, this soil is moderately limited as a site for dwellings. Wetness is an additional limitation on sites for dwellings with basements. Adequate surface and subsurface drainage helps to overcome the wetness. Foundation drains and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness. The construction of foundations, footings, or basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete.

Because of the potential for frost action, the shrink-swell potential, and low strength, this soil is moderately limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action. Providing coarse grained subgrade or base material helps to prevent the damage caused by frost action, low strength, and shrinking and swelling of the soil.

Because of the wetness and the restricted permeability, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the restricted permeability.

The land capability classification is I. No woodland ordination symbol is assigned.

FoA—Foresman silt loam, 0 to 2 percent slopes. This very deep, nearly level, moderately well drained soil is on convex rises. Individual areas are elongated and irregularly shaped. They range from 5 to 40 acres in size. The dominant size is about 20 acres.

Typically, the surface layer is very dark gray silt loam about 10 inches thick. The subsoil is yellowish brown, firm clay loam about 24 inches thick. It is mottled in the lower part. The substratum to a depth of about 60 inches is brown, mottled silt loam that has strata of loamy very fine sand. In places the surface layer is thinner. In a few areas the substratum is not stratified and is firm silt loam. In some places the lower part of the substratum is firm loam till. A few areas have slopes of more than 2 percent and are moderately eroded. In some places the solum is more than 40 inches thick.

Included with this soil in mapping are some small areas of the somewhat poorly drained Darroch and poorly drained Selma soils. Darroch soils are slightly lower on the landscape than the Foresman soil. Selma soils are on the lowest parts of the landscape. Included soils make up about 10 percent of the map unit.

The available water capacity is high in the Foresman soil. Permeability is moderate in the solum and moderately slow in the substratum. The content of organic matter in the surface layer is moderate. Surface runoff is slow. The seasonal high water table is at a depth of 3 to 6 feet from late fall through spring.

Most areas are used for cultivated crops. A few areas are used for pasture, hay, or woodland.

This soil is well suited to corn, soybeans, and small grain. Crop residue management, cover crops, and green manure crops help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. This soil is well suited to ridge-till and no-till cropping systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Overgrazing and grazing during wet periods are the major management concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the shrink-swell potential, this soil is moderately limited as a site for dwellings. Wetness is an additional limitation on sites for dwellings with basements. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness. The construction of foundations, footings, and basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete.

Because of the potential for frost action, the shrink-swell potential, and low strength, this soil is moderately limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to

prevent the damage caused by frost action. Providing coarse grained subgrade or base material helps to prevent the damage caused by frost action, low strength, and shrinking and swelling of the soil.

Because of the wetness and the restricted permeability, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the restricted permeability.

The land capability classification is I. No woodland ordination symbol is assigned.

FoB2—Foresman silt loam, 2 to 6 percent slopes, eroded. This very deep, gently sloping, moderately well drained soil is on ridges and knolls. Individual areas are elongated and irregularly shaped. They range from 5 to 40 acres in size. The dominant size is about 20 acres.

Typically, the surface layer is about 10 inches thick. It is very dark grayish brown silt loam mixed with dark yellowish brown clay loam from the subsoil. The subsoil is about 21 inches thick. It is dark yellowish brown, firm clay loam in the upper part and yellowish brown and brown, mottled, firm clay loam in the lower part. The substratum to a depth of about 60 inches is brown, mottled silt loam that has strata of very fine sand and loamy sand. In some areas the surface layer is thinner. In places the lower part of the substratum is fine loam till. Some areas have slopes of less than 2 percent or more than 6 percent. A few areas are more eroded. In a few places the solum is more than 40 inches thick.

Included with this soil in mapping are small areas of the somewhat poorly drained Darroch and poorly drained Selma soils. Darroch soils are slightly lower on the landscape than the Foresman soil. Selma soils are on the lowest parts of the landscape. Included soils make up about 10 percent of the map unit.

The available water capacity is high in the Foresman soil. Permeability is moderate in the solum and moderately slow in the substratum. The content of organic matter in the surface layer is moderate. Runoff is medium. The seasonal high water table is at a depth of 3 to 6 feet from late fall through spring.

Most areas are used for cultivated crops. A few areas are used for hay, pasture, or woodland.

This soil is well suited to corn, soybeans, and small grain. Erosion is the main management concern. The hazard of erosion can be reduced by using conservation practices, such as crop rotation, critical-area plantings, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and conservation tillage systems that leave a protective cover of crop residue on the surface. Grassed waterways help to control erosion in drainageways. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. In areas where hillside seepage occurs, subsurface drains should be installed. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. This soil is well suited to ridge-till and no-till cropping systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Runoff, the hazard of erosion, overgrazing, and grazing during wet periods are the major management concerns. Overgrazing increases the hazard of erosion and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, causes excessive runoff, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes slows runoff and helps to control erosion. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control erosion, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the shrink-swell potential, this soil is moderately limited as a site for dwellings. Wetness is an additional limitation on sites for dwellings with basements. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness. The construction of foundations, footings, and basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete.

Because of low strength, the shrink-swell potential, and the potential for frost action, this soil is moderately limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength, shrinking and swelling, and frost action.

Because of the wetness and the restricted permeability, this soil is severely limited as a site for

septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the restricted permeability.

The land capability classification is IIe. No woodland ordination symbol is assigned.

FrA—Foresman fine sandy loam, till substratum, 0 to 2 percent slopes. This very deep, nearly level, moderately well drained soil is on convex rises. Individual areas are irregularly shaped and range from 5 to 50 acres in size. The dominant size is about 25 acres.

Typically, the surface layer is black fine sandy loam about 10 inches thick. The subsoil is about 27 inches thick. The upper part is brown and yellowish brown, firm clay loam; the next part is pale brown, mottled, firm loam; and the lower part is brown, mottled, friable loam. The substratum extends to a depth of about 60 inches. The upper part is yellowish brown, mottled silt loam that has strata of loamy fine sand. The lower part is light olive brown, mottled loam. In some areas the surface layer is thinner. In places the surface layer and the subsoil contain more sand. In some areas, the solum is more than 40 inches thick and the depth to loam till is more than 60 inches. Some places have slopes of more than 2 percent and are moderately eroded.

Included with this soil in mapping are some small areas of somewhat poorly drained soils that have friable till. These soils are in the slightly lower positions on the landscape. They make up about 5 percent of the map unit.

The available water capacity is high in the Foresman soil. Permeability is moderate. The content of organic matter in the surface layer is moderate. Runoff is slow. The seasonal high water table is at a depth of 3 to 4 feet from late fall through spring.

Most areas are used for cultivated crops. A few areas are used for hay, pasture, or woodland.

This soil is well suited to corn, soybeans, and small grain. Soil blowing is the main management concern. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. This soil is well suited to ridge-till and no-till cropping systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Soil blowing is a hazard. Overgrazing and grazing during wet periods are also major management concerns. Overgrazing increases the hazard of soil blowing and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control soil blowing, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the shrink-swell potential, this soil is moderately limited as a site for dwellings. Wetness is an additional limitation on sites for dwellings with basements. Adequate surface and subsurface drainage helps to overcome the wetness. Foundation drains and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness. The construction of foundations, footings, or basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete.

Because of low strength, this soil is severely limited as a site for local roads and streets. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength.

Because of the wetness, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness.

The land capability classification is I. No woodland ordination symbol is assigned.

FrB2—Foresman fine sandy loam, till substratum, 2 to 6 percent slopes, eroded. This very deep, gently sloping, moderately well drained soil is on convex ridges or knolls. Individual areas are irregularly shaped and range from 5 to 50 acres in size. The dominant size is about 20 acres.

Typically, the surface layer is about 10 inches thick. It is very dark grayish brown fine sandy loam mixed with dark yellowish brown clay loam from the subsoil. The subsoil is about 23 inches thick. The upper part is dark

yellowish brown, firm clay loam, and the lower part is yellowish brown, mottled, firm clay loam. The substratum extends to a depth of about 60 inches. The upper part is yellowish brown, mottled silt loam that has strata of loamy fine sand and very fine sandy loam. The lower part is brown, mottled loam. In places the surface layer is thinner. In some areas the surface layer and the subsoil contain more sand. In other areas, the solum is more than 40 inches thick and the depth to loam till is more than 60 inches. Some places have slopes of more than 6 percent or less than 2 percent. A few areas are more eroded.

Included with this soil in mapping are some small areas of somewhat poorly drained soils. Included soils make up about 5 percent of the map unit.

The available water capacity is high in the Foresman soil. Permeability is moderate. The content of organic matter in the surface layer is moderate. Runoff is medium. The seasonal high water table is at a depth of 3 to 4 feet from late fall through spring.

Most areas are used for cultivated crops. A few areas are used for hay, pasture, or woodland.

This soil is well suited to corn, soybeans, and small grain. Soil blowing and erosion are the main management concerns. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Erosion and surface runoff can be controlled by using conservation practices, such as crop rotation, critical-area plantings, terraces, diversions, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and conservation tillage systems that leave a protective cover of crop residue on the surface. Grassed waterways help to control erosion in drainageways. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. In areas where hillside seepage occurs, subsurface drains should be installed. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. This soil is well suited to ridge-till and no-till cropping systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Erosion, runoff, and soil blowing are hazards. Overgrazing and grazing when the soil is too wet are also concerns. Overgrazing results in erosion, increases the hazard of soil blowing, and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, causes excessive runoff, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes slows runoff and helps to control soil blowing and erosion. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control erosion and soil blowing, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the shrink-swell potential, this soil is moderately limited as a site for dwellings. Wetness is an additional limitation on sites for dwellings with basements. Adequate surface and subsurface drainage helps to overcome the wetness. Foundation drains and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness. The construction of foundations, footings, or basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete.

Because of low strength, this soil is severely limited as a site for local roads and streets. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength.

Because of the wetness, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness.

The land capability classification is IIe. No woodland ordination symbol is assigned.

FtA—Foresman silt loam, till substratum, 0 to 2 percent slopes. This very deep, nearly level, moderately well drained soil is on convex rises. Individual areas are irregularly shaped and range from 5 to 50 acres in size. The dominant size is about 20 acres.

Typically, the surface soil is very dark grayish brown silt loam about 11 inches thick. The subsoil is about 25 inches thick. The upper part is dark brown, friable clay loam; the next part is dark yellowish brown, mottled, friable clay loam; and the lower part is yellowish brown, mottled, friable loam. The substratum extends to a depth of about 60 inches. The upper part is yellowish

brown, mottled silt loam that has strata of very fine sand and fine sandy loam. The lower part is yellowish brown, mottled loam. In places the surface soil is thinner. In some areas, the solum is more than 40 inches thick and the depth to loam till is more than 60 inches. Some places have slopes of more than 2 percent and are moderately eroded.

Included with this soil in mapping are a few small areas of the poorly drained Selma soils that have a till substratum. These soils are on the lowest parts of the landscape. Also included are a few areas of the somewhat poorly drained Darroch soils that have a till substratum. These soils are in the slightly lower positions on the landscape. Included soils make up about 5 percent of the map unit.

The available water capacity is high in the Foresman soil. Permeability is moderate in the solum and moderately slow or slow in the substratum. The content of organic matter in the surface layer is moderate. Runoff is slow. The seasonal high water table is at a depth of 3 to 6 feet from late fall through spring.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

This soil is well suited to corn, soybeans, and small grain. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. Crop residue management, cover crops, and green manure crops help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to ridge-till and no-till cropping systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Overgrazing and grazing during wet periods are the major management concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the shrink-swell potential, this soil is moderately limited as a site for dwellings. Wetness is an additional limitation on sites for dwellings with basements. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness. The construction of foundations, footings, and basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete.

Because of low strength, the shrink-swell potential, and the potential for frost action, this soil is moderately limited as a site for local roads and streets. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength, shrinking and swelling, and frost action. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action.

Because of the wetness and the restricted permeability, this soil is severely limited as a site for septic tank absorption fields. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the restricted permeability. Perimeter drains around the filter field may help to lower the water table.

The land capability classification is I. No woodland ordination symbol is assigned.

FtB2—Foresman silt loam, till substratum, 2 to 6 percent slopes, eroded. This very deep, gently sloping, moderately well drained soil is on convex ridges or knolls. Individual areas are irregularly shaped and range from 5 to 50 acres in size. The dominant size is about 10 acres.

Typically, the surface layer is about 10 inches thick. It is very dark grayish brown silt loam mixed with dark yellowish brown clay loam from the subsoil. The subsoil is about 26 inches thick. The upper part is dark yellowish brown, friable clay loam; the next part is dark yellowish brown, firm clay loam; and the lower part is yellowish brown, mottled, firm clay loam. The substratum extends to a depth of about 60 inches. The upper part is brown, mottled sandy loam that has strata of loamy fine sand and silt loam. The lower part is brown, mottled loam till. In places the surface layer is thinner. In some areas, the solum is more than 40 inches thick and the depth to loam till is more than 60 inches. Other areas have slopes of less than 2 percent or more than 6 percent. A few areas are more eroded.

Included with this soil in mapping are small areas of the poorly drained Selma soils that have a till substratum. These soils are on the lowest parts of the landscape. Also included are a few areas of the somewhat poorly drained Darroch soils that have a till substratum. These soils are in the slightly lower positions on the landscape. Included soils make up about 5 percent of the map unit.

The available water capacity is high in the Foresman

soil. Permeability is moderate in the solum and moderately slow or slow in the substratum. The content of organic matter in the surface layer is moderate. Runoff is medium. The seasonal high water table is at a depth of 3 to 6 feet from late fall through spring.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

This soil is well suited to corn, soybeans, and small grain. Erosion is the main management concern. Erosion and surface runoff can be controlled by using conservation practices, such as crop rotation, critical-area plantings, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and conservation tillage methods that leave a protective cover of crop residue on the surface. Grassed waterways help to control erosion in drainageways. Crop residue management, cover crops, and green manure crops help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. In areas where hillside seepage occurs, subsurface drains should be installed. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. This soil is well suited to ridge-till and no-till cropping systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Erosion and runoff are hazards. Overgrazing and grazing during wet periods are major management concerns. Grazing during wet periods causes surface compaction, which results in poor soil tilth, causes excessive runoff, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes slows runoff and helps to control erosion. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control erosion, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the shrink-swell potential, this soil is moderately limited as a site for dwellings. Wetness is an additional limitation on sites for dwellings with basements. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness. The construction of foundations, footings, and basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete.

Because of low strength, the shrink-swell potential, and the potential for frost action, this soil is moderately limited as a site for local roads and streets. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength, shrinking and swelling, and frost action. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action.

Because of the wetness and the restricted permeability, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the restricted permeability.

The land capability classification is IIe. No woodland ordination symbol is assigned.

FwA—Foresman silt loam, moderately fine substratum, 0 to 2 percent slopes. This very deep, nearly level, moderately well drained soil is on convex rises. Individual areas are elongated and irregularly shaped. They range from 5 to 40 acres in size. The dominant size is about 20 acres.

Typically, the surface soil is very dark gray silt loam about 14 inches thick. The subsoil is about 15 inches thick. It is brown and yellowish brown, friable clay loam in the upper part and yellowish brown, mottled, friable loam in the lower part. The substratum extends to a depth of about 60 inches. The upper part is yellowish brown, mottled loam that has strata of silt loam and very fine sand. The lower part is yellowish brown, mottled silty clay loam. In places the surface soil is thinner. In some areas, the solum is more than 40 inches thick and the depth to the loam substratum material is more than 60 inches. A few areas have slopes of more than 2 percent and are moderately eroded.

Included with this soil in mapping are a few small areas of somewhat poorly drained soils in which the substratum has material similar to that in the substratum of the Foresman soil. These soils are in the slightly lower positions on the landscape. They make up about 4 percent of the map unit.

The available water capacity is high in the Foresman soil. Permeability is moderate in the solum, moderately slow in the upper part of the substratum, and moderately slow or slow in the lower part of the substratum. The content of organic matter in the surface layer is moderate. Surface runoff is slow. The

seasonal high water table is at a depth of 3 to 6 feet from late fall through spring.

Most areas are used for cultivated crops. A few areas are used for pasture, hay, or woodland.

This soil is well suited to corn, soybeans, and small grain. Crop residue management, cover crops, and green manure crops help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. This soil is well suited to ridge-till and no-till cropping systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Overgrazing and grazing during wet periods are the major management concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the shrink-swell potential, this soil is moderately limited as a site for dwellings. Wetness is an additional limitation on sites for dwellings with basements. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness. The construction of foundations, footings, and basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete.

Because of the potential for frost action, the shrink-swell potential, and low strength, this soil is moderately limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action. Providing coarse grained subgrade or base material helps to prevent the damage caused by frost action, low strength, and shrinking and swelling of the soil.

Because of the wetness and the restricted permeability, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable fill material improves the capacity of the absorption field and helps to overcome the wetness and the restricted permeability.

The land capability classification is I. No woodland ordination symbol is assigned.

GbA—Gilboa-Odell complex, 0 to 2 percent slopes. These very deep, nearly level, somewhat poorly drained soils are on slight rises. The Gilboa soil is on the lower lying side slopes and foot slopes. The Odell soil is on the adjacent upper side slopes and summits. Individual areas of these soils are dominantly irregular in shape and range from 3 to 60 acres in size. The dominant size is about 20 acres. The areas are about 40 percent Gilboa soil and 35 percent Odell soil. The two soils occur as areas so intricately mixed or so small that it is not practical to separate them in mapping.

Typically, the surface layer of the Gilboa soil is very dark gray silt loam about 10 inches thick. The subsoil is about 40 inches thick. The upper part is brown, mottled, friable silty clay loam; the next part is dark brown, mottled, friable clay loam; and the lower part is grayish brown, mottled, firm loam. The substratum to a depth of about 60 inches is grayish brown loam. In a few areas the dark surface layer is thinner. In a few places the lower part of the solum and the substratum have more clay. In some areas the substratum has less clay and more sand. Other areas have slopes of more than 2 percent. In some places the substratum is silt loam.

Typically, the surface layer of the Odell soil is black silt loam about 10 inches thick. The subsurface layer is very dark gray silt loam about 3 inches thick. The subsoil is about 22 inches thick. It is dark yellowish brown, dark brown, and brown, mottled, friable clay loam in the upper part and yellowish brown, mottled, firm loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, mottled loam. In places the dark surface layer is thinner. In some areas the substratum is silt loam till. In a few places the solum is more than 40 inches thick.

Included with these soils in mapping are a few small areas of the moderately well drained Barce, Corwin, and Montmorenci soils. These included soils are on the higher lying rises. They make up about 10 percent of the map unit.

The available water capacity is high in the Gilboa soil and moderate in the Odell soil. Permeability is moderate in the upper part of the solum of both soils. It is moderately slow in the lower part of the solum and slow or very slow in the substratum. The content of organic matter in the surface layer is moderate. Runoff is slow. The seasonal high water table is at a depth of 1 to 3 feet from winter through early spring.

Most areas are used for cultivated crops. Some small areas are used for hay or pasture.

These soils are well suited to corn, soybeans, and

small grain. Wetness is the main management concern. A drainage system helps to lower the water table and raises the temperature of the soils more quickly in the spring. Excess water can be removed by surface drains, subsurface drains, open ditches, or a combination of these practices. Conservation practices, such as conservation tillage that leaves a protective cover of crop residue on the surface, cover crops, and green manure crops, help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. The soils are well suited to fall chisel and ridge-till cropping systems.

These soils are well suited to grasses and legumes, such as orchardgrass and ladino clover, for hay or pasture. Excess water and frost heaving are limitations. The excess water can be removed by surface drains, subsurface drains, or a combination of these practices. Overgrazing and grazing during wet periods are major management concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted legumes. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of wetness, these soils are severely limited as sites for dwellings. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Buildings can be constructed on raised, well compacted fill material.

Because of low strength, the Gilboa soil is severely limited as a site for local roads and streets. The potential for frost action is a severe limitation in areas of the Odell soil. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength and frost action. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent frost damage.

Because of the wetness and the restricted permeability, these soils are severely limited as sites for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of absorption field and helps to overcome the wetness and the restricted permeability.

The land capability classification is IIw. No woodland ordination symbol is assigned.

Gf—Gilford fine sandy loam. This very deep, nearly level, very poorly drained soil is in broad depressional areas. It is frequently ponded for brief periods by surface runoff from surrounding soils. Individual areas are irregularly shaped and range from 5 to 40 acres in size. The dominant size is about 20 acres.

Typically, the surface layer is black fine sandy loam about 9 inches thick. The subsurface layer also is black fine sandy loam. It is about 6 inches thick. The subsoil is very dark gray and dark gray, mottled, friable fine sandy loam about 19 inches thick. It has strata of sand in the lower part. The substratum to a depth of about 60 inches is light brownish gray and brown, mottled fine sand. In some areas iron nodules are in the solum.

Included with this soil in mapping are some small areas of the somewhat poorly drained Seafield soils in the higher positions on the landscape. Also included are a few areas of the very poorly drained Wallkill Variant soils in the lower lying areas. Wallkill Variant soils have more clay in the solum than the Gilford soil and have muck in the profile. Included soils make up about 6 percent of the map unit.

The available water capacity is moderate in the Gilford soil. Permeability is moderately rapid in the solum and rapid in the substratum. The content of organic matter in the surface layer is moderate. Runoff is very slow or ponded. The seasonal high water table is at or above the surface from winter through spring.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

This soil is well suited to corn, soybeans, and small grain. Ponding, wetness, soil blowing, and droughtiness are the main management concerns (fig. 9). A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Ponded areas can generally be drained with an open inlet pipe in conjunction with subsurface drainage. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Pumping can be used in areas where a suitable outlet is not available. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. Excessive drainage by the subsurface drainage system may cause droughtiness. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Irrigation systems can reduce seasonal crop

Figure 9.—Wetness and ponding can delay fieldwork in early spring in areas of Gilford fine sandy loam.

stress and increase crop yields. Cover crops, green manure crops, and crop residue management help to maintain or improve the rate of water infiltration and the content of organic matter. This soil is well suited to the ridge-till cropping system.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Ponding, soil blowing, and droughtiness are management concerns. Frost heaving, excess water, overgrazing, and grazing during wet periods are also concerns. Water management practices, such as drainage and irrigation, are necessary for high yields of hay and pasture. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Water-tolerant species are best suited. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted legumes. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is fairly well suited to trees. The main management concerns are equipment limitations, seedling mortality, the windthrow hazard, and plant competition. The equipment limitations can be overcome by delaying timber harvest until dry periods

or until the soil is frozen. Planting more trees than is necessary helps to overcome seedling mortality, but thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Selecting water-tolerant species helps to overcome the windthrow hazard. Harvest methods that do not leave the remaining trees isolated or widely spaced should be used. Care should be taken to avoid damaging the surficial root systems of unharvested trees. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the ponding, this soil is generally unsuitable as a site for dwellings or sanitary facilities. Because of the ponding and the potential for frost action, the soil is severely limited as a site for local roads and streets. Maintaining a crown in roads, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action and by ponding. Providing coarse grained subgrade or base material helps to prevent the damage caused by frost action.

The land capability classification is IIw. The woodland ordination symbol is 4W.

GhB—Glenhall loam, 1 to 4 percent slopes. This very deep, nearly level or gently sloping, moderately well drained soil is on slightly convex rises or ridges. Individual areas are irregularly shaped and range from 10 to 80 acres in size. The dominant size is about 20 acres.

Typically, the surface layer is very dark brown loam about 9 inches thick. The subsoil is about 40 inches thick. The upper part is yellowish brown, friable clay loam; the next part is yellowish brown, mottled, friable loam; and the lower part is yellowish brown, mottled, very friable gravelly sandy loam. The substratum to a depth of about 60 inches is yellowish brown, mottled sand that has strata of loam. In a few places the surface layer is thicker. In other places the surface layer is lighter in color. A few areas have slopes of more than 4 percent and are moderately eroded. In places carbonates are below a depth of 60 inches. In some areas loamy glacial till is in the lower part of the substratum.

Included with this soil in mapping are a few small areas of the somewhat poorly drained Darroch soils. These soils are in the slightly lower positions on the landscape. Also included are some small areas of the well drained Ormas soils in the slightly higher lying areas. Included soils make up about 6 percent of the map unit.

The available water capacity is moderate in the Glenhall soil. Permeability is moderate in the solum and moderately rapid in the substratum. The content of organic matter in the surface layer is moderate. Runoff is medium. The seasonal high water table is at a depth of 2.5 to 3.5 feet from winter through spring.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Erosion is the main management concern. Erosion and surface runoff can be controlled by using conservation practices, such as crop rotation, critical-area plantings, terraces, diversions, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and conservation tillage systems that leave a protective amount of crop residue on the surface. Grassed waterways help to control erosion in drainageways. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. This soil is well suited to ridge-till and no-till cropping systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Erosion and runoff are hazards. Overgrazing and grazing during wet periods are also major management concerns. Overgrazing increases the hazard of erosion and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, causes excessive runoff, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes slows runoff and helps to control erosion. Proper stocking rates, pasture rotation, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control erosion, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the shrink-swell potential, this soil is moderately limited as a site for dwellings. Wetness is an additional limitation on sites for dwellings with basements. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to

overcome the wetness. The construction of foundations, footings, and basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete.

Because of the potential for frost action, this soil is severely limited as a site for local roads and streets. Providing coarse grained subgrade or base material helps to prevent the damage caused by frost action. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent frost damage.

Because of the wetness, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the high water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness.

The land capability classification is IIe. No woodland ordination symbol is assigned.

Gn—Granby mucky loamy fine sand. This very deep, nearly level, very poorly drained soil is in broad depressional areas. It is frequently ponded for brief periods by surface runoff from surrounding soils. Individual areas are broad and irregularly shaped and range from 40 to 400 acres in size. The dominant size is about 150 acres.

Typically, the surface layer is black mucky loamy fine sand about 10 inches thick. The subsoil is about 14 inches thick. It is dark gray and gray, mottled, very friable sand. The substratum to a depth of about 60 inches is light brownish gray, mottled sand. In places the dark surface layer is less than 10 inches thick.

Included with this soil in mapping are small areas of the very poorly drained Adrian and Zadog soils in the lower lying areas. Adrian soils have muck in the profile. Zadog soils have iron nodules in the solum and have more clay in the solum than the Granby soil. Also included are small areas of the somewhat poorly drained Morocco soils in the slightly higher positions on the landscape. Included soils make up about 10 percent of the map unit.

The available water capacity is low in the Granby soil. Permeability is rapid. The content of organic matter in the surface layer is high. Runoff is very slow or ponded. The seasonal high water table is at or above the surface in late fall and spring.

Most areas are used for cultivated crops. A few areas are used for woodland or pasture.

This soil is fairly well suited to corn, soybeans, and small grain. Wetness, ponding, soil blowing, and droughtiness are the main management concerns. A drainage system helps to lower the water table in early spring and raises the temperature of the soil more quickly in the spring, thus allowing the planting of longer season varieties of adapted crops. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Pumping can be used in areas where a suitable outlet is not available. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Excessive drainage by the subsurface drainage system may cause droughtiness. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Irrigation systems can reduce crop stress and increase crop yields. Crop residue management, cover crops, and green manure crops help to maintain or improve tilth and the content of organic matter. This soil is well suited to the ridge-till cropping system.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Ponding, soil blowing, and droughtiness are management concerns. Frost heaving and excess water are also limitations, and overgrazing and grazing during wet periods are major concerns. Water management practices, such as drainage and irrigation, are necessary for high yields of hay and pasture. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Water-tolerant species are best suited to this soil. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is fairly well suited to trees. The main management concerns are equipment limitations, seedling mortality, the windthrow hazard, and plant competition. The equipment limitations can be reduced by delaying timber harvest until dry periods or until the

soil is frozen. Planting more trees than is necessary helps to overcome seedling mortality, but thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Selecting water-tolerant species helps to overcome the windthrow hazard. Harvest methods that do not leave the remaining trees isolated or widely spaced should be used. Care should be taken to avoid damaging the surficial root systems of unharvested trees. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the ponding, this soil is generally unsuitable as a site for dwellings. Also, the ponding is a severe limitation if the soil is used as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by ponding.

The land capability classification is IIIw. The woodland ordination symbol is 4W.

Gt—Granby loamy fine sand. This very deep, nearly level, very poorly drained soil is in broad depressional areas. It is frequently ponded for brief periods by surface runoff from surrounding soils. Individual areas are broad and irregularly shaped and range from 20 to 300 acres in size. The dominant size is about 100 acres.

Typically, the surface layer is black loamy fine sand about 10 inches thick. The subsurface layer is very dark gray loamy fine sand about 4 inches thick. The subsoil is about 23 inches thick. It is dark gray, mottled, very friable fine sand in the upper part and light brownish gray, mottled, very friable sand in the lower part. The substratum to a depth of about 60 inches is pale brown, mottled sand. In places the dark surface layer is less than 10 inches thick. In a few areas a layer of loam or clay loam is in the subsoil. In some places the upper part of the profile is more acid. In a few areas the dark surface layer is more than 24 inches thick.

Included with this soil in mapping are a few small areas of the moderately well drained Brems soils, the somewhat poorly drained Morocco and Watseka soils, and the very poorly drained Adrian and Zadog soils. Brems soils are in the highest positions on the landscape. Morocco and Watseka soils are slightly higher on the landscape than the Granby soil. Adrian soils have muck in the profile. Zadog soils have iron nodules and contain more clay in the solum than the Granby soil. They are in the lower lying areas. Included soils make up about 10 percent of the map unit.

The available water capacity is low in the Granby soil. Permeability is rapid. The content of organic matter in the surface layer is moderate. Runoff is very slow or ponded. The seasonal high water table is at or above the surface from late fall through spring.

Most areas are used for cultivated crops. A few areas are used for woodland or pasture.

This soil is fairly well suited to corn, soybeans, and small grain. Wetness, ponding, soil blowing, and droughtiness are the main management concerns. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring, thus allowing the planting of longer season varieties of adapted crops. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Pumping can be used in areas where a suitable outlet is not available. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Excessive drainage by the subsurface drainage system may cause droughtiness. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Irrigation can reduce crop stress and increase crop yields. Crop residue management, cover crops, and green manure crops help to maintain or improve tilth and the content of organic matter. This soil is well suited to the ridge-till cropping system.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Ponding, soil blowing, and droughtiness are hazards. Frost heaving and excess water are limitations. Overgrazing and grazing during wet periods are major management concerns. Water management practices, such as drainage and irrigation, are necessary for high yields of hay and pasture. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses

and legumes helps to control soil blowing. Water-tolerant species are best suited to this soil. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is fairly well suited to trees. The main management concerns are equipment limitations, the windthrow hazard, seedling mortality, and plant competition. The equipment limitations can be overcome by delaying timber harvest until dry periods or until the soil is frozen. Planting more trees than is necessary helps to overcome seedling mortality, but thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Selecting water-tolerant species helps to overcome the windthrow hazard. Harvest methods that do not leave the remaining trees isolated or widely spaced should be used. Care should be taken to avoid damaging the surficial root systems of unharvested trees. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the ponding, this soil is generally unsuitable as a site for dwellings or sanitary facilities. Also, the ponding is a severe limitation if the soil is used as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by ponding.

The land capability classification is IIIw. The woodland ordination symbol is 4W.

Ho—Houghton muck, drained. This very deep, nearly level, very poorly drained soil is in depressions. It is frequently ponded for brief periods by surface runoff from surrounding soils. Individual areas are oval and range from 5 to 350 acres in size. The dominant size is about 50 acres.

Typically, the surface layer is black muck about 10 inches thick. The next part is very dark brown, friable muck that extends to a depth of about 43 inches. Below this to a depth of about 60 inches is very dark grayish brown muck. In places sandy, loamy, or marly material is above a depth of 51 inches. In some areas mineral material from the higher surrounding areas has been washed over the muck.

Included with this soil in mapping are some small areas of the very poorly drained Adrian Variant soils. These soils are in the slightly higher areas. They have sandy material within a depth of 15 inches. They make up about 2 percent of the map unit.

The available water capacity is very high in the Houghton soil. Permeability is moderately rapid to moderately slow. The content of organic matter in the surface layer is very high. Runoff is very slow or ponded. The seasonal high water table is at or above the surface from fall through spring.

Most areas are used for cultivated crops. A few areas are used for pasture.

This soil is fairly well suited to corn and soybeans. Wetness, ponding, and soil blowing are the main management concerns. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring. The wetness can be reduced by controlling the water table with open ditches, surface drains, and subsurface drains. Pumping can be used in areas where a suitable outlet is not available. Ponded areas can generally be drained with an open inlet pipe in conjunction with subsurface drainage. Drainage systems should be designed so that they keep the water table at the level required by crops during the growing season and raise the water table to the surface during the rest of the year. Such systems minimize oxidation and subsidence of the organic materials and reduce the hazard of soil blowing. Because the soil is unstable, caution is advised if heavy equipment is used near open ditches. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. This soil is well suited to the spring plow cropping system.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Soil blowing and ponding are hazards. Frost heaving, excess water, the possibility that drainage outlets are not available, and subsidence of the muck after drainage are also concerns. Other management concerns are overgrazing and grazing when the soil is too wet. The muck may be unstable. Ponded areas hinder the use of equipment, and machinery bogs down in this soil when it is wet. Management of the water table determines the rate at which the muck oxidizes. Overdrainage increase the oxidation rate. If drainage outlets are available, excess water can be removed by

surface drains, subsurface drains, pumping, or a combination of these practices. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Drainage helps to control the stability of the muck. Overgrazing reduces plant density and hardiness. Grazing during wet periods reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted legumes. Proper stocking rates, timely deferment of grazing, and restricted use during wet periods maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is poorly suited to trees. The main management concerns are equipment limitations, seedling mortality, the windthrow hazard, and plant competition. The equipment limitations can be overcome by delaying timber harvest until dry periods or until the soil is frozen. Planting more trees than is necessary helps to overcome seedling mortality, but thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Selecting water-tolerant species helps to overcome the windthrow hazard. Harvest methods that do not leave the remaining trees isolated or widely spaced should be used. Care should be taken to avoid damaging the surficial root systems of unharvested trees. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the ponding, this soil is generally unsuitable as a site for dwellings or sanitary facilities. The ponding, subsidence, and the potential for frost action are severe limitations if this soil is used as a site for local roads and streets. Maintaining a crown in roads, constructing the roads on raised, well compacted fill material, strengthening or replacing the base material, and providing adequate side ditches and culverts help to prevent the damage caused by subsidence, frost action, and ponding. Providing coarse grained subgrade or base material also helps to prevent the damage caused by subsidence and by frost action.

The land capability classification is IIIw. The woodland ordination symbol is 2W.

Ir—Iroquois fine sandy loam. This very deep, nearly level, very poorly drained soil is in broad depressional areas. It is frequently ponded for brief periods by surface runoff from surrounding soils. Individual areas are irregularly shaped and range from 40 to 50 acres in size. The dominant size is about 200 acres.

Typically, the surface layer is black fine sandy loam about 8 inches thick. The subsurface layer is very dark gray, mottled fine sandy loam about 3 inches thick. The subsoil is about 25 inches thick. The upper part is grayish brown, mottled, friable sandy clay loam, and the lower part is gray, mottled, firm clay loam. The substratum to a depth of about 60 inches is gray, mottled silty clay. In places the upper part of the solum has more clay. In a few places the soil has more sand in the substratum or has more sand throughout. In some areas the solum is more than 38 inches thick.

Included with this soil in mapping are some small areas of Papineau, Simonin, Strole, and Wesley soils. The somewhat poorly drained Papineau, Strole, and Wesley soils are slightly higher on the landscape than the Iroquois soil. The moderately well drained Simonin soils are in the higher positions on the landscape. Included soils make up about 9 percent of the map unit.

The available water capacity is moderate in the Iroquois soil. Permeability is moderate in the solum and slow in the substratum. The content of organic matter in the surface layer is high. Runoff is very slow or ponded. The seasonal high water table is at or above the surface from late fall through spring.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness, ponding, and soil blowing are the main management concerns. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Ponded areas can generally be drained with an open inlet pipe in conjunction with subsurface drainage. Pumping can be used in areas where a suitable outlet is not available. The tile lines in subsurface drainage systems should be closely spaced because of the clayey subsoil. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to the ridge-till cropping system.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Ponding and soil blowing are hazards. Frost heaving, excess water, overgrazing, and grazing during wet periods are also major management concerns. Water management practices, such as drainage, are necessary for high yields of hay and pasture. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Water-tolerant species are best suited to this soil. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted legumes. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the ponding, this soil is generally unsuitable as a site for dwellings or sanitary facilities. The ponding and the potential for frost action are severe limitations if this soil is used as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action and ponding. Providing coarse grained subgrade or base material also helps to prevent the damage caused by frost action.

The land capability classification is IIw. No woodland ordination symbol is assigned.

Ke—Kentland mucky fine sand. This very deep, nearly level, very poorly drained soil is in nearly level or depressional areas. It is frequently ponded for brief periods by surface runoff from surrounding soils. Individual areas are broad and irregularly shaped and range from 300 to 1,000 acres in size. The dominant size is about 400 acres.

Typically, the surface layer is black mucky fine sand about 9 inches thick. The subsurface layer is black, mottled mucky fine sand about 3 inches thick. The next layer is about 4 inches thick. It is very dark grayish brown muck that has a very high content of marl. The substratum to a depth of about 60 inches is light yellowish brown, dark yellowish brown, yellowish brown, and grayish brown, mottled fine sand. In some areas the dark surface soil is thinner.

Included with this soil in mapping are a few small areas of the somewhat poorly drained Tedrow and Zaborosky soils in the slightly higher positions on the landscape. Also included are some areas of the very poorly drained Ackerman soils, which have coprogenous earth in the profile. Ackerman soils are in positions on the landscape similar to those of the Kentland soil. Included soils make up about 10 percent of the map unit.

The available water capacity is low in the Kentland soil. Permeability is moderate in the organic deposits and rapid in the sandy deposits. The content of organic matter in the surface layer is very high. Runoff is very slow or ponded. The seasonal high water table is at or above the surface from late fall through spring.

Most areas are used for cultivated crops. A few areas are used as woodland or pasture.

This soil is fairly well suited to corn, soybeans, and small grain. Wetness, ponding, soil blowing, and droughtiness are the main management concerns. The surface layer is very friable and dries out quickly in the spring. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring, thus allowing the planting of longer season varieties of adapted crops. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Pumping can be used in areas where a suitable outlet is not available. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Excessive drainage by the subsurface drainage system can cause droughtiness. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Irrigation can reduce seasonal crop stress and increase crop yields. Droughtiness can be minimized by controlling the water table with subsurface irrigation. Crop residue management, cover crops, and green manure crops help to maintain or improve tilth and the content of organic matter. This soil is well suited to the spring plow cropping system.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Ponding, soil blowing, and droughtiness are hazards. Frost heaving, excess water, overgrazing, and grazing during wet periods are also major management concerns. Water management practices, such as drainage and irrigation, are necessary for high yields of hay and pasture. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces

forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Water-tolerant species are best suited to this soil. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted legumes. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the ponding, this soil is generally unsuitable as a site for dwellings or sanitary facilities. Also, the ponding is a severe limitation if this soil is used as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to overcome the ponding.

The land capability classification is IIIw. No woodland ordination symbol is assigned.

MeA—Martinsville-Williamstown complex, 0 to 2 percent slopes. These very deep, nearly level, well drained and moderately well drained soils are on convex ridges or knolls. The Martinsville soil is on summits and the upper side slopes. The Williamstown soil is on the lower lying side slopes and foot slopes. Individual areas of these soils are irregularly shaped and range from 15 to 50 acres in size. The dominant size is about 30 acres. The areas are about 45 percent Martinsville soil and 30 percent Williamstown soil. The two soils occur as areas so intricately mixed or so small that it is not practical to separate them in mapping.

Typically, the surface layer of the Martinsville soil is dark grayish brown fine sandy loam about 8 inches thick. The subsoil is about 40 inches thick. It is friable. The upper part is dark yellowish brown clay loam, the next part is dark brown sandy clay loam, and the lower part is strong brown and yellowish brown loam. The substratum to a depth of about 60 inches is yellowish brown loam that has strata of fine sandy loam, loamy sand, and sand. In places the soil has a dark surface layer. In a few areas gray mottles are in the lower part of the solum. In some places the upper part of the solum contains more sand. In some areas the substratum is sand and gravel. In a few places the lower part of the subsoil has less sand. In places the substratum is till material. Some areas have slopes of more than 2 percent.

Typically, the surface layer of the Williamstown soil is dark grayish brown loam about 8 inches thick. The subsoil is yellowish brown, mottled, friable clay loam about 30 inches thick. The substratum extends to a depth of about 60 inches. It is yellowish brown, mottled loam in the upper part and brown loam in the lower part. In a few places the soil has a dark surface layer. In places the surface layer contains more sand. In some areas the substratum is stratified loams and sands.

Included with these soils in mapping are some small areas of Miami, Aubbeenaubbee, Whitaker, Ross, and Sawabash soils. The well drained Miami soils are in the more sloping positions. The somewhat poorly drained Aubbeenaubbee and Whitaker soils are in the less sloping areas. The well drained Ross and very poorly drained Sawabash soils are in the lower lying areas adjacent to slopes. Included soils make up about 15 percent of the map unit.

The available water capacity is high in the Martinsville soil and moderate in the Williamstown soil. Permeability is moderate in the upper part of the Martinsville soil and moderate or moderately rapid in the lower part. It is moderate in the solum of the Williamstown soil and slow or very slow in the substratum. The content of organic matter in the surface layer of both soils is moderately low. Runoff is slow. The Williamstown soil has a high water table at a depth of 2.5 to 3.5 feet from winter through early spring.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

These soils are well suited to corn, soybeans, and small grain. Soil blowing is a management concern in areas of the Martinsville soil. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Crop residue management, cover crops, and green manure crops help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. These soils are well suited to ridge-till and no-till cropping systems.

These soils are well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Soil blowing is a hazard. Overgrazing and grazing during wet periods are major management concerns. Overgrazing increases the hazard of soil blowing and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, causes excessive runoff, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control erosion, minimize surface compaction, maintain good plant density and hardiness, and help to

keep the pasture in good condition.

These soils are well suited to trees. Plant competition is severe in areas of the Martinsville soil and moderate in areas of the Williamstown soil. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the shrink-swell potential, these soils are moderately limited as sites for dwellings without basements. Wetness is an additional limitation in areas of the Williamstown soil. The Martinsville soil is suited to use as a site for dwellings with basements, but the Williamstown soil is severely limited because of the wetness. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness. The construction of foundations, footings, or basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete.

Because of the shrink-swell potential and the potential for frost action, the Martinsville soil is moderately limited as a site for local roads and streets. The Williamstown soil is severely limited as a site for local roads and streets because of low strength and the potential for frost action. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength, shrinking and swelling of the soil, and frost action.

Because of the restricted permeability, the Martinsville soil is moderately limited as a site for septic tank absorption fields. Because of the wetness and the restricted permeability, the Williamstown soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the restricted permeability in areas of the Williamstown soil. Enlarging the absorption field improves the absorption of liquid waste and helps to overcome the restricted permeability in areas of the Martinsville soil.

The land capability classification is I. The woodland ordination symbol is 4A for the Martinsville soil and 5A for the Williamstown soil.

MeB2—Martinsville-Williamstown complex, 2 to 6 percent slopes, eroded. These very deep, gently sloping, well drained and moderately well drained soils are on convex ridges or knolls. The Martinsville soil is on summits and the upper side slopes. The Williamstown soil is on the lower lying side slopes and foot slopes. Individual areas of these soils are irregularly shaped and range from 15 to 100 acres in size. The dominant size is about 20 acres. The areas are about 45 percent Martinsville soil and 35 percent Williamstown soil. The two soils occur as areas so intricately mixed or so small that it is not practical to separate them in mapping.

Typically, the surface layer of the Martinsville soil is dark grayish brown fine sandy loam mixed with brown clay loam from the subsoil. It is about 9 inches thick. The subsoil is about 37 inches thick. It is friable. The upper part is brown and dark yellowish brown clay loam, the next part is strong brown loam, and the lower part is dark yellowish brown sandy loam. The substratum to a depth of about 60 inches is yellowish brown sandy loam that has strata of loamy sand and silt loam. In some areas the soil has a dark surface layer. In a few areas the lower part of the solum has gray mottles. In some places the upper part of the solum contains more sand. In other places the substratum is sand and gravel. In a few areas the lower part of the subsoil has less sand. In places the substratum is till material. Some areas have slopes of more than 6 percent or less than 2 percent. A few areas are more eroded.

Typically, the surface layer of the Williamstown soil is dark grayish brown loam mixed with brown clay loam from the subsoil. It is about 8 inches thick. The subsoil is about 27 inches thick. The upper part is brown and yellowish brown, mottled, friable clay loam, and the lower part is yellowish brown, mottled, firm loam. The substratum to a depth of about 60 inches is yellowish brown, mottled loam. In a few places the soil has a dark surface layer. In a few areas the surface layer contains more sand. In places the substratum is stratified sands and loams. Some areas have slopes of more than 6 percent or less than 2 percent. A few areas are more eroded.

Included with these soils in mapping are some small areas of Miami, Aubbeenaubbee, Whitaker, Ross, and Sawabash soils. The well drained Miami soils are in the more sloping positions. The somewhat poorly drained Aubbeenaubbee and Whitaker soils are in the less sloping areas. The well drained Ross and very poorly drained Sawabash soils are in the lower lying areas

adjacent to slopes. Included soils make up about 15 percent of the map unit.

The available water capacity is high in the Martinsville soil and moderate in the Williamstown soil. Permeability is moderate in the upper part of the Martinsville soil and moderate or moderately rapid in the lower part. It is moderate in the solum of the Williamstown soil and slow or very slow in the substratum. The content of organic matter in the surface layer of both soils is moderately low. Runoff is medium. The Williamstown soil has a high water table at a depth of 1.5 to 3.5 feet from winter through early spring.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

These soils are well suited to corn, soybeans, and small grain. Erosion is the main management concern. The hazard of soil blowing is an additional concern in areas of the Martinsville soil. Erosion and surface runoff can be controlled by critical-area plantings, crop rotation, water- and sediment-control basins, terraces, diversions, cover crops, green manure crops, grade-stabilization structures, and conservation tillage systems that leave a protective cover of crop residue on the surface. Grassed waterways help to control erosion in drainageways. In areas where hillside seepage occurs, subsurface drains should be installed. Crop residue management, cover crops, and green manure crops help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. These soils are well suited to ridge-till and no-till cropping systems.

These soils are well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Controlling erosion and runoff is the main management concern. The hazard of soil blowing is an additional concern in areas of the Martinsville soil. Overgrazing and grazing during wet periods are also management concerns. Overgrazing increases the hazards of soil blowing and erosion and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor tilth, causes excessive runoff, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes slows runoff and helps to control soil blowing and erosion. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control erosion, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

These soils are well suited to trees. Plant competition is severe in areas of the Martinsville soil and moderate in areas of the Williamstown soil. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the shrink-swell potential, these soils are moderately limited as sites for dwellings without basements. Wetness is an additional limitation in areas of the Williamstown soil. The Martinsville soil is suited to use as a site for dwellings with basements, but the Williamstown soil is severely limited because of the wetness. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness. The construction of foundations, footings, or basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete.

Because of the shrink-swell potential and the potential for frost action, the Martinsville soil is moderately limited as a site for local roads and streets. The Williamstown soil is severely limited as a site for local roads and streets because of low strength and the potential for frost action. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength, shrinking and swelling of the soil, and frost action.

Because of the restricted permeability, the Martinsville soil is moderately limited as a site for septic tank absorption fields. The Williamstown soil is severely limited for this use because of the wetness and the restricted permeability. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the restricted permeability in areas of the Williamstown soil. Enlarging the absorption field improves the absorption of liquid waste and helps to overcome the restricted permeability in areas of the Martinsville soil.

The land capability classification is IIe. The woodland ordination symbol is 4A for the Martinsville soil and 5A for the Williamstown soil.

Mh—Maumee loamy fine sand. This very deep, nearly level, very poorly drained soil is in nearly level or

slightly depressional areas. It is frequently ponded for brief periods by surface runoff from surrounding soils. Individual areas are broad and irregularly shaped. They range from 40 to 500 acres in size and typically are about 200 acres.

Typically, the surface soil is black and very dark gray loamy fine sand about 18 inches thick. The underlying material extends to a depth of about 60 inches. It is dark gray, mottled sand in the upper part and dark grayish brown and grayish brown, mottled fine sand in the lower part. In places the solum is more acid. In some areas, accumulations of iron are in the upper part of the profile or the gray colors in the lower part of the profile are masked by iron stains. In a few places a thin layer of loam or clay loam is in the upper part of the profile.

Included with this soil in mapping are a few small areas of the moderately well drained Brems soils, the somewhat poorly drained Watseka soils, and the very poorly drained Zadog soils. Brems soils are higher on the landscape than the Maumee soil. Watseka soils are slightly higher on the landscape than the Maumee soil. Zadog soils have iron nodules and contain more clay in the solum than the Maumee soil They are in the lower positions on the landscape. Included soils make up about 8 percent of the map unit.

The available water capacity is low in the Maumee soil. Permeability is rapid. The content of organic matter in the surface layer is moderate. Runoff is very slow or ponded. The seasonal high water table is at or above the surface from early fall through spring.

Most areas are used for cultivated crops. This soil is primarily in the Willow Slough Fish and Wildlife Area and is managed for wildlife habitat. During harvesting, a portion of the crop is usually left in the field to provide food for wildlife. Areas of this soil are manually ponded from early fall to late spring for migrating waterfowl.

This soil is fairly well suited to corn, soybeans, and small grain. Wetness, ponding, soil blowing, and droughtiness are the main management concerns. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring, thus allowing the planting of longer season varieties of adapted crops. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Ponded areas can generally be drained with an open inlet pipe in conjunction with subsurface drainage. Pumping can be used in areas where a suitable outlet is not available. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Excessive drainage by the subsurface drainage system may cause droughtiness. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Irrigation can reduce seasonal crop stress and increase crop yields. Droughtiness can be minimized by controlling the water table with subsurface irrigation. Crop residue management, green manure crops, and cover crops improve or maintain tilth and the content of organic matter. This soil is well suited to the ridge-till cropping system.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Ponding, soil blowing, and droughtiness are hazards. Frost heaving, excess water, overgrazing, and grazing during wet periods are also major management concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Water-tolerant species are best suited to this soil. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted legumes. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is fairly well suited to trees. The main management concerns are equipment limitations and the windthrow hazard. The equipment limitations can be overcome by delaying timber harvest until dry periods or until the soil is frozen. Selecting water-tolerant species helps to overcome the windthrow hazard. Harvest methods that do not leave the remaining trees isolated or widely spaced should be used. Care should be taken to avoid damaging the surficial root systems of unharvested trees. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the ponding, this soil is generally unsuitable as a site for dwellings or sanitary facilities (fig. 10). Also, the ponding is a severe limitation if the soil is used as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill

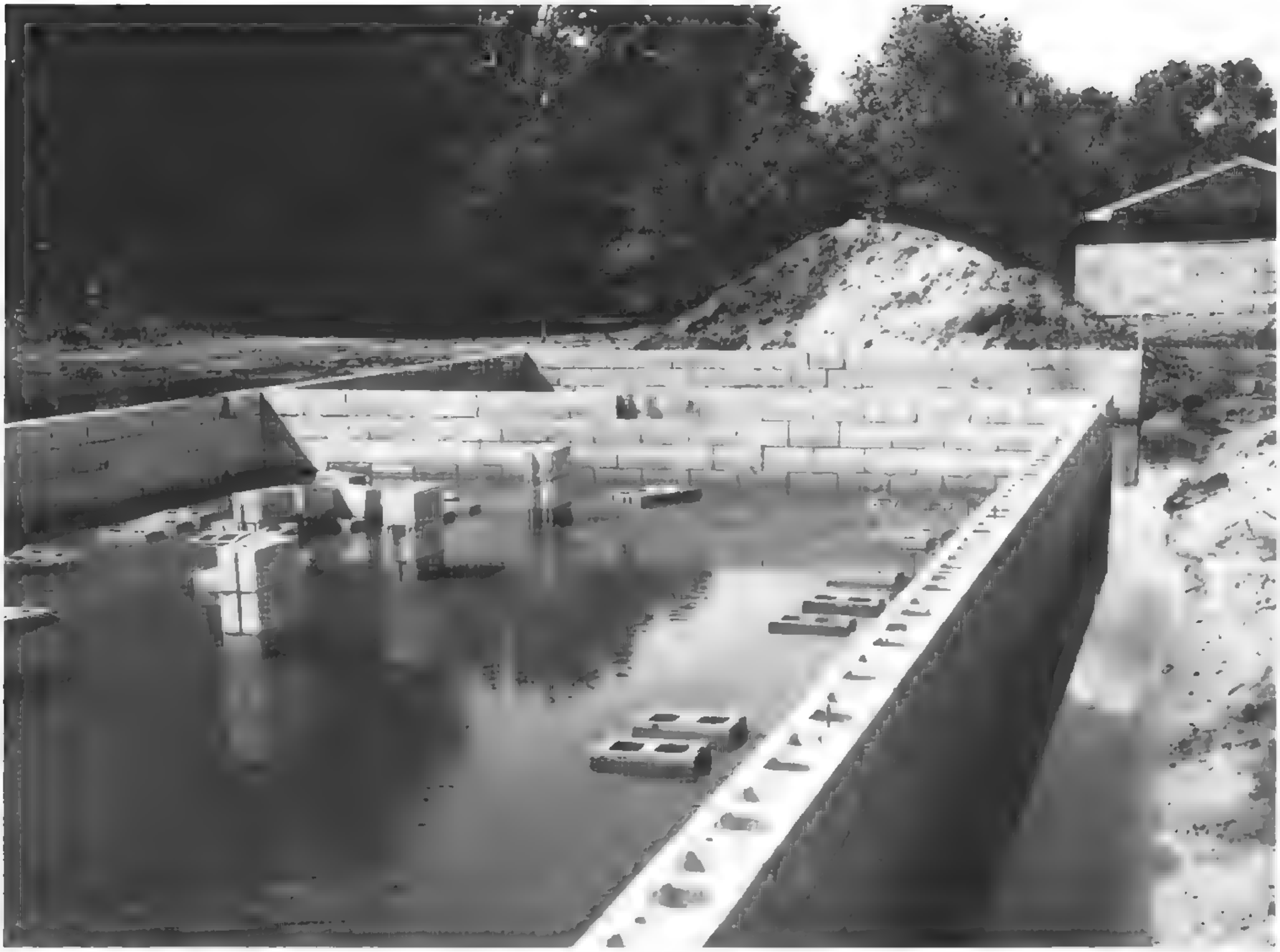

Figure 10.—The high water table and ponding are limitations if Maumee loamy fine sand is used as a site for dwellings.

material, and providing adequate side ditches and culverts help to prevent the damage caused by ponding.

The land capability classification is IIIw. The woodland ordination symbol is 4W.

Mk—Maumee mucky loamy fine sand. This very deep, nearly level, very poorly drained soil is in broad depressional areas. It is frequently ponded for brief periods by surface runoff from surrounding soils. Individual areas are broad and irregularly shaped and range from 15 to 100 acres in size. The dominant size is about 30 acres.

Typically, the surface soil is black mucky loamy fine sand about 18 inches thick. The substratum to a depth of about 60 inches is brown and dark grayish brown sand. In some areas, accumulations of iron are in the upper part of the profile or the gray colors in the lower part of the profile are masked by iron stains.

Included with this soil in mapping are a few small areas of the moderately well drained Brems soils, the somewhat poorly drained Watseka soils, and the very poorly drained Zadog soils. Brems soils are in the highest positions on the landscape. Watseka soils are slightly higher on the landscape than the Maumee soil. Zadog soils have iron nodules and contain more clay in the solum than the Maumee soil. They are in the lower positions on the landscape. Included soils make up about 10 percent of the map unit.

The available water capacity is low in the Maumee soil. Permeability is rapid. The content of organic matter

in the surface layer is very high. Runoff is very slow or ponded. The seasonal high water high table is at or above the surface from late fall through spring.

Most areas are used for cultivated crops. A few areas are used as woodland or pasture.

This soil is fairly well suited to corn, soybeans, and small grain. Wetness, ponding, soil blowing, and droughtiness are the main management concerns. The surface layer is very friable and dries out quickly in the spring. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring, thus allowing the planting of longer season varieties of adapted crops. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Pumping can be used in areas where a suitable outlet is not available. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Excessive drainage by the subsurface drainage system may cause droughtiness. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Irrigation can reduce crop stress during the summer months and can increase crop yields. Droughtiness can be minimized by controlling the water table with subsurface irrigation. Crop residue management, cover crops, and green manure crops help to maintain or improve tilth and the content of organic matter. This soil is well suited to the ridge-till cropping system.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. The ponding, soil blowing, and droughtiness are hazards. Frost heaving, excess water, overgrazing, and grazing during wet periods are also major management concerns. Water management practices, such as drainage and irrigation, are necessary for high yields of hay and pasture. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Water-tolerant species are best suited to this soil. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted legumes. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is fairly well suited to trees. The main management concerns are equipment limitations and the windthrow hazard. The equipment limitations can be overcome by delaying timber harvest until dry periods or until the soil is frozen. Selecting water-tolerant species helps to overcome the windthrow hazard. Harvest methods that do not leave the remaining trees isolated or widely spaced should be used. Care should be taken to avoid damaging the surficial root systems of unharvested trees. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the ponding, this soil is generally unsuitable as a site for dwellings or sanitary facilities. Also, the ponding is a severe limitation if the soil is used as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by ponding.

The land capability classification is IIIw. The woodland ordination symbol is 4W.

MnC2—Miami loam, 6 to 12 percent slopes, eroded. This very deep, moderately sloping, well drained soil is on convex ridges or knolls. Individual areas are irregularly shaped and range from 5 to 60 acres in size. The dominant size is about 15 acres.

Typically, the surface layer is dark grayish brown loam mixed with dark brown clay loam from the subsoil. It is about 9 inches thick. The subsoil is about 21 inches thick. It is dark brown and yellowish brown, friable clay loam in the upper part and yellowish brown, friable loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown loam. In some areas the lower part of the subsoil has more sand. In other areas the subsoil contains less clay. A few places have slopes of less than 6 percent or more than 12 percent. Some areas are more eroded. In a few areas gray mottles are in the lower part of the subsoil.

Included with this soil in mapping are some small areas of the very poorly drained Comfrey and Sawabash soils and the moderately well drained Williamstown soils. Comfrey and Sawabash soils are on the lowest parts of the landscape. Williamstown soils

are in the slightly lower positions on the landscape. Also included are a few areas of well drained, severely eroded soils on the steeper slopes. Included soils make up about 5 percent of the map unit.

The available water capacity is moderate in the Miami soil. Permeability is moderate in the solum and slow or very slow in the substratum. The content of organic matter in the surface layer is moderately low. Runoff is medium.

Most areas are used for cultivated crops. A few areas are used as pasture or woodland.

This soil is fairly well suited to corn, soybeans, and small grain. Erosion is the main management concern. Erosion and surface runoff can be controlled by using conservation practices, such as crop rotation, critical-area plantings, terraces, diversions, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and conservation tillage systems that leave a protective cover of crop residue on the surface. Grassed waterways help to control erosion in drainageways. In areas where hillside seepage occurs, subsurface drains should be installed. Crop residue management, cover crops, and green manure crops help to maintain tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to ridge-till and no-till cropping systems (fig. 11).

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Controlling runoff and erosion is a major management concern. Overgrazing and grazing during wet periods are also concerns. Overgrazing increases the hazard of erosion and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, causes excessive runoff, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes slows runoff and helps to control erosion. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control erosion, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the slope and the shrink-swell potential, this soil is moderately limited as a site for dwellings. Grading can modify the slope. Retaining walls can be installed, and the design of the dwellings can compensate for the slope. The construction of foundations, footings, or basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete.

Because of low strength, this soil is severely limited as a site for local roads and streets. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength. The upper layer of the soil should be replaced or strengthened with a more suitable base material.

Because of the restricted permeability, this soil is severely limited as a site for septic tank absorption fields. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the restricted permeability.

The land capability classification is IIIe. The woodland ordination symbol is 5A.

MnE—Miami loam, 15 to 25 percent slopes. This very deep, strongly sloping to moderately steep, well drained soil is on convex ridges or knolls. Individual areas are irregularly shaped and range from 5 to 30 acres in size. The dominant size is about 15 acres.

Typically, the surface layer is dark gray loam about 5 inches thick. The subsurface layer is pale brown loam about 3 inches thick. The subsoil is about 25 inches thick. It is dark yellowish brown and yellowish brown, friable clay loam in the upper part and yellowish brown, friable loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown loam. In some areas the lower part of the subsoil has more sand. In places the subsoil contains less clay. Some areas have slopes of less than 15 percent or more than 25 percent. A few areas are moderately eroded.

Included with this soil in mapping are some small areas of the very poorly drained Comfrey and Sawabash soils. These soils are in the lowest positions on the landscape. Also included are small areas of the moderately well drained Williamstown soils in the slightly lower positions on the landscape and a few areas of well drained, severely eroded soils on the steeper slopes. Included soils make up about 5 percent of the map unit.

The available water capacity is moderate in the Miami soil. Permeability is moderate in the solum and slow or very slow in the substratum. The content of organic matter in the surface layer is moderately low. Runoff is rapid.

Most areas are used as woodland. A few areas are used for pasture.

This soil is generally unsuited to corn, soybeans, and small grain. The slope and the hazard of erosion

Figure 11.—No-till corn in an area of Miami loam, 6 to 12 percent slopes, eroded.

are the main management concerns.

This soil is poorly suited to grasses and legumes, such as orchardgrass and alfalfa, for hay but is fairly well suited to pasture. Controlling erosion and runoff is the main management concern. On the steeper slopes, the use of some types of equipment may be hazardous. A system of conservation tillage that leaves a protective cover of crop residue on the surface should be used if hay or pasture is established or remove. Overgrazing and grazing when the soil is too wet are additional management concerns. Overgrazing increases the hazard of erosion and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, causes excessive runoff, reduces forage yields, damages the sod, and reduces plant density and hardiness. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control erosion, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is fairly well suited to trees. The hazard of erosion, equipment limitations, and plant competition are the main management concerns. Using proper

harvesting techniques helps to control erosion. Constructing logging roads and skid trails on the contour also helps to prevent excessive erosion. Road ditches, culverts, and grade-stabilization structures should be used to control runoff from roads and skid trails. Because of the slope, the use of crawlers and rubber-tired tractors can be hazardous. It may be necessary to yard the logs uphill with cable. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the slope, this soil is generally unsuitable as a site for dwellings or sanitary facilities. Because of low strength and the slope, the soil is severely limited as a site for local roads and streets. Placing roads and streets on the contour helps to overcome the slope. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength. The upper layer of the soil should be replaced or strengthened with a more suitable base material.

The land capability classification is VIe. The woodland ordination symbol is 5R.

Mp—Montgomery silty clay loam. This very deep, nearly level, very poorly drained soil is in broad depressional areas. It is frequently ponded for brief periods by surface runoff from surrounding soils. Individual areas are generally broad and irregularly shaped and range from 5 to 50 acres in size. The dominant size is about 20 acres.

Typically, the surface layer is black silty clay loam about 10 inches thick. The subsurface layer is about 7 inches thick. It is black, mottled silty clay loam in the upper part and very dark gray, mottled silty clay in the lower part. The subsoil is about 27 inches thick. The upper part is gray, mottled, firm silty clay, and the lower part is light gray and grayish brown, mottled, firm silty clay loam. The substratum to a depth of about 60 inches is light olive brown and grayish brown, mottled silty clay. In some places the upper part of the solum contains less clay.

Included with this soil in mapping are some small areas of the somewhat poorly drained Strole soils. These soils are slightly higher on the landscape than the Montgomery soil. Also included are a few areas of the moderately well drained Simonin soils in the higher positions on the landscape. Included soils make up about 6 percent of the map unit.

The available water capacity is high in the Montgomery soil. Permeability is slow. The content of organic matter in the surface layer is high. Surface runoff is very slow or ponded. The seasonal high water table is at or above the surface from winter through spring.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

This soil is fairly well suited to corn, soybeans, and small grain. Wetness and ponding are the main management concerns. The surface layer is firm. If it is tilled when wet, large clods form. The clods become hard when they dry. This cloddiness makes preparing a seedbed difficult. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring, thus allowing the planting of longer season varieties of adapted crops. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Water management practices, such as drainage, are necessary for high yields of adapted crops. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Pumping can be used in areas where a suitable outlet is not available. If a subsurface drainage system is installed in the clayey material, the tile lines should be closely spaced. Crop residue management, cover crops, and green manure crops help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to fall plowing, fall chisel, and ridge-planting cropping systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. The ponding, frost heaving, and excess water are management concerns. Overgrazing and grazing during wet periods are also concerns. Water management practices, such as drainage, are necessary for high yields of hay and pasture. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Water-tolerant species are best suited to this soil. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted legumes. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is well suited to trees. The main management concerns are equipment limitations, seedling mortality, the windthrow hazard, and plant competition. The equipment limitations can be overcome by delaying timber harvest until dry periods or until the soil is frozen. Planting more trees than is necessary helps to overcome seedling mortality, but

thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock or planting larger trees. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Selecting water-tolerant species helps to overcome the windthrow hazard. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the ponding, this soil is generally unsuited to building site development and sanitary facilities. Because of the ponding, the shrink-swell potential, and low strength, the soil is severely limited as a site for local roads and streets. Maintaining a crown in roads, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by ponding. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength and by shrinking and swelling of the soil.

The land capability classification is IIIw. The woodland ordination symbol is 5W.

MrB2—Montmorenci fine sandy loam, 2 to 6 percent slopes, eroded. This very deep, gently sloping, moderately well drained soil is on convex rises and knolls. Individual areas are dominantly irregularly shaped and range from 3 to 200 acres in size. The dominant size is about 40 acres.

Typically, the surface layer is very dark grayish brown fine sandy loam mixed with dark yellowish brown clay loam from the subsoil. It is about 9 inches thick. The subsoil is friable clay loam about 24 inches thick. The upper part is dark yellowish brown, and the lower part is yellowish brown and is mottled. The substratum to a depth of about 60 inches is brown, mottled loam. In places the dark surface layer is thicker. In a few areas the lower part of the subsoil does not have gray mottles. In some small areas the depth to the underlying material is less than 24 inches or more than 40 inches. Some places have slopes of less than 2 percent or more than 6 percent. A few areas are more eroded.

Included with this soil in mapping are some small areas of the somewhat poorly drained Odell soils. These soils are slightly lower on the landscape than the Montmorenci soil. Also included are a few areas of the very poorly drained Peotone soils in depressions. Included soils make up about 8 percent of the map unit.

The available water capacity is moderate in the Montmorenci soil. Permeability is moderate in the solum and slow or very slow in the substratum. The content of organic matter in the surface layer is moderate. Runoff is medium. The water table is at a depth of 2.5 to 4.0 feet from late fall through spring.

Most areas are used for cultivated crops. Some small areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. The hazards of erosion and soil blowing are the main management concerns. Erosion and surface runoff can be controlled by water- and sediment-control basins, diversions, terraces, a system of conservation tillage that leaves a protective cover of crop residue on the surface, cover crops, green manure crops, crop rotation, grade-stabilization structures, or a combination of these practices. Grassed waterways help to control erosion in drainageways. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to no-till or ridge-till cropping systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay or pasture. Controlling erosion, runoff, and soil blowing is the main management concern. Overgrazing and grazing when the soil is too wet are additional concerns. Overgrazing increases the hazards of erosion and soil blowing and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, causes excessive runoff, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes slows runoff and helps to control soil blowing and erosion. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control erosion and soil blowing, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the shrink-swell potential, this soil is moderately limited as a site for dwellings without basements. It is severely limited as a site for dwellings with basements because of wetness. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness. The

construction of foundations, footings, or basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete.

Because of the shrink-swell potential and low strength, this soil is moderately limited as a site for local roads and streets. The upper layer of the soil should be replaced or strengthened with a more suitable base material. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength and by shrinking and swelling of the soil.

Because of the wetness, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the high water table. Filling or mounding with a suitable filter material improves the capacity of the absorption field and helps to overcome the wetness.

The land capability classification is IIe. No woodland ordination symbol is assigned.

MuA—Morocco loamy sand. This very deep, nearly level, somewhat poorly drained soil is on slightly convex rises. Individual areas are long and irregularly shaped. They range from 3 to 200 acres in size. The dominant size is about 10 acres.

Typically, the surface layer is very dark grayish brown loamy sand about 9 inches thick. The subsoil is about 28 inches thick. It is pale brown and yellowish brown, mottled, very friable fine sand. The substratum to a depth of about 60 inches is light brownish gray, yellowish brown, reddish brown, and light brownish gray, mottled fine sand. In some areas the dark surface layer is thicker. In many places the gray mottles are not readily visible because of iron stains on the sand grains. In some areas iron accumulations are throughout the solum. In a few places the subsoil has a thin band of loam, sandy clay loam, or clay loam. Some areas have loam till below a depth of 40 inches. In a few places the soil is less acid throughout. Some areas have slopes of more than 2 percent.

Included with this soil in mapping are some small areas of the very poorly drained Granby and Newton soils. These soils are in the lower positions on the landscape. Also included are a few areas of the moderately well drained Brems and Oakville soils in the more sloping positions. Included soils make up about 10 percent of the map unit.

The available water capacity is low in the Morocco soil. Permeability is rapid. The content of organic matter in the surface layer is low. Surface runoff is very slow. The seasonal high water table is at a depth of 1 to 2 feet from winter through early spring.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

This soil is poorly suited to corn, soybeans, and small grain. Droughtiness, wetness, and the hazard of soil blowing are the main management concerns. Irrigation systems can be used to reduce seasonal crop stress and increase crop yields. Droughtiness can be minimized by controlling the water table with subsurface irrigation. In late fall and early spring, the wetness can be reduced by controlling the water table with open ditches, surface drains, and subsurface drains. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. Excessive drainage by the subsurface drainage system may cause droughtiness. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Crop residue management, cover crops, and green manure crops help to maintain or improve tilth and the content of organic matter. This soil is well suited to the ridge-till cropping system.

This soil is well suited to grasses and legumes, such as orchardgrass and birdsfoot trefoil, for hay and pasture. Soil blowing and droughtiness are hazards. Excess water and frost heaving are limitations. The excess water can be removed by surface drains, subsurface drains, or a combination of these practices. Irrigation can reduce droughtiness. Overgrazing and grazing during wet periods are also major management concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is well suited to trees. Equipment limitations, seedling mortality, and plant competition are the main management concerns. The equipment limitations can be overcome by delaying timber harvest until dry periods or until the soil is frozen. Planting more trees than is necessary helps to overcome seedling mortality, but thinning may be required later. The seedling

mortality rate can also be reduced by using containerized stock or planting larger stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Pines, which have a deep taproot system, generally grow well on this soil. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the wetness, this soil is severely limited as a site for dwellings. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness.

Because of the wetness and the potential for frost action, this soil is moderately limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to minimize the damage caused by frost action and wetness. Providing coarse grained subgrade or base material helps to prevent the damage caused by frost action.

Because of the wetness and poor filtering qualities, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the poor filtering capacity.

The land capability classification is IVs. The woodland ordination symbol is 4S.

NsA—Nesius loamy fine sand, 0 to 1 percent slopes. This very deep, nearly level, moderately well drained soil is on slightly convex rises or ridges. Individual areas are irregularly shaped and range from 5 to 200 acres in size. The dominant size is about 40 acres.

Typically, the surface soil is black loamy fine sand about 16 inches thick. The subsoil is about 35 inches thick. The upper part is dark brown, very friable sand, and the lower part is brown, yellowish brown, pale brown, and strong brown, mottled, very friable sand. The substratum to a depth of about 60 inches is yellowish brown and yellowish red, mottled sand. In a few places the surface soil is thinner and lighter colored. In some areas loamy sand or sandy loam strata are in the lower part of the subsoil or the substratum or both.

Included with this soil in mapping are a few small areas of the somewhat poorly drained Watseka soils in the lower positions on the landscape. Also included are a few areas of the excessively drained Sparta soils in the higher lying areas. Included soils make up about 6 percent of the map unit.

The available water capacity is low in the Nesius soil. Permeability is rapid. The content of organic matter in the surface layer is moderate. Runoff is slow. The seasonal high water table is at a depth of 2.5 to 4.0 feet from late fall through spring.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

This soil is poorly suited to corn, soybeans, and small grain. Droughtiness and the hazard of soil blowing are the main management concerns. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. Irrigation systems can reduce seasonal crop stress and increase crop yields. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Crop residue management, green manure crops, and cover crops help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to the no-till cropping system.

This soil is well suited to grasses and legumes, such as bromegrass and alfalfa, for pasture. It is well suited to hay. Soil blowing and droughtiness are hazards. Overgrazing and grazing during wet periods are also major management concerns. Overgrazing increases the hazard of soil blowing and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Irrigation can reduce droughtiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Deep-rooted legumes and drought-tolerant species are best suited. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control soil blowing, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is fairly well suited to trees. The main management concerns are seedling mortality and plant competition. Planting more trees than is necessary helps to overcome seedling mortality, but thinning may be required later. The seedling mortality rate can also

be reduced by using containerized stock or planting larger stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Pines, which have a deep taproot system, generally grow well on this soil. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

This soil is suitable as a site for dwellings without basements. It is moderately limited as a site for dwellings with basements because of wetness. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness.

This soil is suitable as a site for local roads and streets.

Because of the wetness and poor filtering qualities, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the poor filtering capacity.

The land capability classification is IVs. The woodland ordination symbol is 3S.

NsB—Nesius loamy fine sand, 1 to 4 percent slopes. This very deep, nearly level or gently sloping, moderately well drained soil is on slightly convex rises or ridges. Individual areas are irregularly shaped and range from 5 to 80 acres in size. The dominant size is about 25 acres.

Typically, the surface layer is black loamy fine sand about 10 inches thick. The subsurface layer is very dark brown loamy fine sand about 5 inches thick. The subsoil is about 38 inches thick. The upper part is dark brown, very friable fine sand, and the lower part is yellowish brown, light yellowish brown, and strong brown, mottled, very friable fine sand. The substratum to a depth of about 60 inches is yellowish brown, mottled fine sand. In a few places the surface soil is thinner and lighter colored. In some areas strata of loamy sand or sandy loam are in the lower part of the subsoil or the substratum or both. A few areas have slopes of more than 4 percent.

Included with this soil in mapping are a few small areas of the excessively drained Sparta soils in the higher lying areas and the somewhat poorly drained Watseka soils in the lower lying areas. Included soils make up about 6 percent of the map unit.

The available water capacity is low in the Nesius soil. Permeability is rapid. The content of organic matter in the surface layer is moderately low or moderate. Runoff is slow. The seasonal high water table is at a depth of 2.5 to 4.0 feet from late fall through spring.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

This soil is poorly suited to corn, soybeans, and small grain. Droughtiness and the hazard of soil blowing are the main management concerns. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. Irrigation systems can reduce seasonal crop stress and increase crop yields. The hazard of soil blowing can be reduced by using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Crop residue management, green manure crops, and cover crops help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to the no-till cropping system.

This soil is well suited to grasses and legumes, such as bromegrass and alfalfa, for pasture. It is fairly well suited to hay. Droughtiness and the hazard of soil blowing are management concerns. Overgrazing and grazing when the soil is too wet are additional concerns. Overgrazing increases the hazard of soil blowing and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Irrigation can reduce droughtiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control erosion and soil blowing, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is fairly well suited to trees. The main management concerns are seedling mortality and plant competition. Planting more trees than is necessary helps to overcome seedling mortality, but thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock or planting larger stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Pines, which have a deep taproot system, generally grow well on this soil. Site preparation and the control or removal of unwanted

trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

This soil is suitable as a site for dwellings without basements. It is moderately limited as a site for dwellings with basements because of wetness. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness.

This soil is suitable as a site for local roads and streets.

Because of the wetness and poor filtering qualities, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the poor filtering capacity.

The land capability classification is IVs. The woodland ordination symbol is 3S.

Nw—Newton loamy fine sand, undrained. This very deep, nearly level, very poorly drained soil is in broad depressional areas. It is frequently ponded for brief periods by surface runoff from surrounding areas. Individual areas are elongated and irregularly shaped and range from 20 to 400 acres in size. The dominant size is about 80 acres.

Typically, the surface layer is very dark grayish brown loamy fine sand about 5 inches thick. The substratum extends to a depth of about 60 inches. It is gray, brown, light gray, and light brownish gray, mottled fine sand in the upper part and light gray and pale brown, mottled sand in the lower part. In a few places iron stains are throughout the profile and tend to mask the gray colors. In a few areas iron concretions and accumulations are in the upper part of the profile. In places thin strata of loamy sand or sandy loam are in the upper part of the substratum.

Included with this soil in mapping are a few small areas of the somewhat poorly drained Morocco soils and the moderately well drained Brems soils. These soils are higher on the landscape than the Newton soil. Also included are the well drained and moderately well drained Oakville soils in the highest positions on the landscape. Included soils make up about 10 percent of the map unit.

The available water capacity is low in the Newton soil. Permeability is rapid. The content of organic matter in the surface layer is moderate. Runoff is very slow or ponded. The seasonal high water table is at or above the surface from early winter through spring.

Most areas are in wooded parcels of state-owned fish and game preserves.

This soil is generally unsuited to corn, soybeans, and small grain and hay crops and is poorly suited to pasture. Wetness, ponding, and the low available water capacity are the main limitations. Unless major land reclamation efforts are applied, farming is generally not feasible. Draining areas of this soil is very costly because of the dense stands of timber.

This soil is fairly well suited to trees. The main management concerns are equipment limitations, seedling mortality, the windthrow hazard, and plant competition. The equipment limitations can be overcome by delaying timber harvest until dry periods or until the soil is frozen. Planting more trees than is necessary helps to overcome seedling mortality, but thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock or planting larger stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Selecting water-tolerant species helps to overcome the windthrow hazard. Harvest methods that do not leave the remaining trees isolated or widely spaced should be used. Care should be taken to avoid damaging the surficial root systems of unharvested trees. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the ponding, this soil is generally unsuitable as a site for dwellings and sanitary facilities and is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to overcome the ponding.

The land capability classification is Vw. The woodland ordination symbol is 4W.

OaB—Oakville fine sand, 2 to 6 percent slopes. This very deep, gently sloping, well drained soil is on convex ridges. Individual areas are long and irregularly shaped. They range from 5 to 200 acres in size. The dominant size is about 40 acres.

Typically, the surface layer is very dark grayish brown fine sand about 6 inches thick. The subsoil is very friable fine sand about 30 inches thick. The upper part is brown, and the lower part is yellowish brown. The substratum to a depth of about 60 inches is pale brown sand. In a few areas the surface layer is thicker and darker or is fine sandy loam or both. In some

places the subsoil has textural bands of loamy sand or sandy loam. In some areas gray mottles are in the underlying material. In places the substratum is coarse sand or loam till. A few areas have slopes of less than 2 percent or more than 6 percent.

Included with this soil in mapping are a few small areas of the very poorly drained Newton and Wallkill Variant soils. These soils are lower on the landscape than the Oakville soil. Also included are areas of the moderately well drained Brems soils and the somewhat poorly drained Morocco and Zaborosky soils in the slightly lower lying areas. Included soils make up about 10 percent of the map unit.

The available water capacity is low in the Oakville soil. Permeability is rapid. The content of organic matter in the surface layer is low. Runoff is very slow.

Most areas are used as woodland. A few areas are used for cultivated crops, hay, or pasture.

This soil is poorly suited to corn, soybeans, and small grain. Droughtiness and the hazard of soil blowing are the main management concerns. Irrigation systems can reduce seasonal crop stress and increase crop yields. The hazard of soil blowing can be reduced by using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Crop residue management, cover crops, and green manure crops help to maintain or improve tilth and the content of organic matter. This soil is well suited to the no-till cropping system.

This soil is fairly well suited to grasses and legumes, such as bromegrass and alfalfa, for pasture. It is well suited to hay. Droughtiness and the hazard of soil blowing are management concerns. Overgrazing and grazing during wet periods are also major concerns. Overgrazing increases the hazard of soil blowing and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, causes excessive runoff, reduces forage yields, damages the sod, and reduces plant density and hardiness. Irrigation can reduce droughtiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Deep-rooted legumes and drought-tolerant species are best suited to this soil. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control soil blowing, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is well suited to trees. Equipment limitations and seedling mortality are the main management concerns. Because the soil is sandy, equipment tends to bog down during very dry periods. Planting more trees than is necessary helps to overcome seedling mortality, but thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock or larger planting stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Pines, which have a deep taproot system, generally grow well on this soil. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

This soil is suitable as a site for dwellings and local roads and streets. Because of poor filtering qualities, however, it is severely limited as a site for septic tank absorption fields. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the poor filtering capacity.

The land capability classification is IVs. The woodland ordination symbol is 4S.

OaC—Oakville fine sand, 6 to 15 percent slopes. This very deep, moderately sloping or strongly sloping, well drained soil is on convex ridges. Individual areas are long and irregularly shaped. They range from 5 to 150 acres in size. The dominant size is about 25 acres.

Typically, the surface layer is very dark grayish brown fine sand about 5 inches thick. The subsoil is very friable fine sand about 31 inches thick. The upper part is brown and dark yellowish brown, and the lower part is yellowish brown. The substratum to a depth of about 60 inches is brownish yellow fine sand. In a few areas the surface layer is thicker and darker or is fine sandy loam or both. In some places the subsoil has textural bands of loamy sand or sandy loam. In some areas gray mottles are in the underlying material. In places the substratum is coarse sand. A few areas have slopes of less than 6 percent or more than 15 percent.

Included with this soil in mapping are a few small areas of the very poorly drained Newton and Wallkill Variant soils. These soils are lower on the landscape than the Oakville soil. Also included are areas of the moderately well drained Brems soils and the somewhat poorly drained Morocco and Zaborosky soils in the slightly lower lying areas. Included soils make up about 7 percent of the map unit.

The available water capacity is low in the Oakville soil. Permeability is rapid. The content of organic matter in the surface layer is low. Runoff is slow.

Most areas are used as woodland. A few areas are used for cultivated crops, hay, or pasture.

This soil is generally unsuited to corn, soybeans, and small grain. Droughtiness and the hazard of soil blowing are the main management concerns.

This soil is fairly well suited to grasses and legumes,

such as bromegrass and alfalfa, for hay. It is well suited to pasture. Droughtiness and the hazard of soil blowing are management concerns. Overgrazing and grazing during wet periods are also major concerns. Overgrazing increases the hazard of soil blowing and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, causes excessive runoff, reduces forage yields, damages the sod, and reduces plant density and hardiness. Irrigation can reduce droughtiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Deep-rooted legumes and drought-tolerant species are best suited to the soil. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control soil blowing, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is suited to trees. Equipment limitations and seedling mortality are the main management concerns. Because the soil is sandy, equipment tends to bog down during very dry periods. Planting more trees than is necessary helps to overcome seedling mortality, but thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock or larger planting stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Pines, which have a deep taproot system, generally grow well on this soil. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the slope, this soil is moderately limited as a site for dwellings. Land grading and installing retaining walls help to overcome the slope, or the dwellings can be designed so that they conform to the natural slope of the land. Because of the slope, the soil is moderately limited as a site for local roads and streets. Placing the roads and streets on the contour helps to overcome the slope. Cutting and filling may be needed.

Because of poor filtering qualities, this soil is severely limited as a site for septic tank absorption fields. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the poor filtering capacity.

The land capability classification is VIs. The woodland ordination symbol is 4S.

ObB—Oakville fine sand, moderately wet, 1 to 3 percent slopes. This very deep, nearly level or gently sloping, moderately well drained soil is on slightly convex rises or ridges. Individual areas are irregularly shaped and range from 5 to 50 acres in size. The dominant size is about 10 acres.

Typically, the surface layer is very dark grayish brown fine sand about 8 inches thick. The subsoil is dark yellowish brown and yellowish brown, very friable fine sand about 26 inches thick. The substratum to a depth of about 60 inches is yellowish brown and pale brown, mottled fine sand. In a few areas the surface layer is thicker and darker or is fine sandy loam or both. In a few places the surface layer is lighter colored. In some areas the subsoil has textural bands of loamy sand or sandy loam. In places the soil is brown throughout. In a few places the substratum is coarse sand or loam till. Some areas have slopes of more than 3 percent or less than 1 percent.

Included with this soil in mapping are a few small areas of the very poorly drained Newton and Wallkill Variant soils. These soils are lower on the landscape than the Oakville soil. Also included are many areas of the moderately well drained Brems soils and the somewhat poorly drained Morocco and Zaborosky soils in the slightly lower lying areas. Brems soils have gray mottles in the lower part of the subsoil. Included soils make up about 15 percent of the map unit.

The available water capacity is low in the Oakville soil. Permeability is rapid. The content of organic matter in the surface layer is low. Runoff is very slow. The seasonal high water table is at a depth of 3 to 6 feet from late fall through early spring.

Most areas are used for cultivated crops. A few areas are used for hay, pasture, or woodland.

This soil is poorly suited to corn, soybeans, and small grain. Droughtiness and the hazard of soil blowing are the main management concerns. Irrigation systems can reduce crop stress during the summer and can increase crop yields. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Crop residue management, cover crops, and green manure crops help to maintain or improve tilth and the content of organic matter. This soil is well suited to the no-till cropping system.

This soil is fairly well suited to grasses and legumes, such as bromegrass and alfalfa, for hay or pasture. Droughtiness and the hazard of soil blowing are management concerns. Overgrazing and grazing during wet periods are also major concerns. Overgrazing increases the hazard of soil blowing and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, causes excessive runoff, reduces forage yields,

damages the sod, and reduces plant density and hardiness. Irrigation can reduce droughtiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Deep-rooted legumes and drought-tolerant species are best suited to this soil. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control soil blowing, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is well suited to trees. Equipment limitations and seedling mortality are the main management concerns. Because the soil is sandy, equipment tends to bog down during very dry periods. Planting more trees than is necessary helps to overcome seedling mortality, but thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock or larger planting stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Pines, which have a deep taproot system, generally grow well on this soil. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

This soil is suitable as a site for dwellings without basements. Because of wetness, it is moderately limited as a site for dwellings with basements. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness.

This soil is suitable as a site for local roads and streets.

Because of the wetness and poor filtering qualities, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the poor filtering capacity and the wetness.

The land capability classification is IVs. The woodland ordination symbol is 4S.

OcC2—Octagon loam, 6 to 12 percent slopes, eroded. This very deep, moderately sloping, well drained soil is on convex ridges or knolls. Individual areas are irregularly shaped and range from 5 to 60 acres in size. The dominant size is about 15 acres.

Typically, the surface layer is dark brown loam mixed with yellowish brown clay loam from the subsoil. It is about 7 inches thick. The subsoil is yellowish brown and brown, friable clay loam about 18 inches thick. The substratum to a depth of about 60 inches is brown loam. In a few areas, the dark surface layer is thicker or the surface layer is light colored. In places the substratum is stratified. In some areas the surface layer contains more sand. In a few places gray mottles are in the lower part of the subsoil. Some areas have slopes of less than 6 percent or more than 12 percent. In a few severely eroded areas, the solum is less than 24 inches thick.

Included with this soil in mapping are some small areas of the very poorly drained Barry and Wallkill soils in the lowest positions on the landscape; small areas of the somewhat poorly drained Sumava soils, which are slightly lower on the landscape than the Octagon soil; and a few areas of severely eroded soils on the steeper slopes. Also included are some areas that have stones on the surface. The stones are as much as 1 foot in diameter. Included areas make up about 8 percent of the map unit.

The available water capacity is moderate in the Octagon soil. Permeability is moderate in the solum and moderately slow in the substratum. The content of organic matter in the surface layer is moderate. Runoff is medium.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

This soil is fairly well suited to corn, soybeans, and small grain. The hazard of erosion is the main management concern. Erosion and surface runoff can be controlled by crop rotation, critical-area plantings, terraces, diversions, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and conservation tillage systems that leave a protective cover of crop residue on the surface. Grassed waterways help to control erosion in drainageways. In areas where hillside seepage occurs, subsurface drains should be installed. Crop residue management, cover crops, and green manure crops help to maintain tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to ridge-till and no-till cropping systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Controlling erosion and runoff is the major management concern. Overgrazing and grazing when the soil is too wet are also concerns. Overgrazing increases the hazard of erosion and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, causes excessive runoff, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes slows runoff and helps to control erosion. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to

control erosion, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the slope and the shrink-swell potential, this soil is moderately limited as a site for dwellings. Land grading and installing retaining walls help to overcome the slope, or the dwellings can be designed so that they conform to the natural slope of the land. The construction of foundations, footings, and basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete.

Because of low strength, the slope, and the shrink-swell potential, this soil is moderately limited as a site for local roads and streets. Placing the roads and streets on the contour helps to overcome the slope. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength and by shrinking and swelling.

Because of the slope and the restricted permeability, this soil is moderately limited as a site for septic tank absorption fields. Grading or land shaping can modify the slope. Installing the absorption field on the contour also helps to overcome the slope. Enlarging the absorption field improves the absorption of liquid waste and helps to overcome the restricted permeability.

The land capability classification is IIIe. No woodland ordination symbol is assigned.

OkB2—Octagon-Ayr complex, 2 to 6 percent slopes, eroded. This map unit consists of very deep, gently sloping, well drained soils on convex ridges or knolls. The Octagon soil is typically on summits and side slopes. The Ayr soil is typically on the lower side slopes and foot slopes on the leeward side of the mapped areas. Individual areas of these soils are irregularly shaped and range from 5 to 200 acres in size. The dominant size is about 70 acres. The areas are about 60 percent Octagon soil and 25 percent Ayr soil. The two soils occur as areas so intricately mixed or so small that it is not practical to separate them in mapping.

Typically, the surface layer of the Octagon soil is very dark grayish brown fine sandy loam mixed with dark yellowish brown loam from the subsoil. It is about 9 inches thick. The subsoil is about 22 inches thick. The upper part is dark yellowish brown, friable loam, and the lower part is yellowish brown, friable clay loam. The substratum to a depth of about 60 inches is brown loam. In some areas the lower part of the subsoil has gray mottles. In other areas, the dark surface layer is thicker or the surface layer is light colored. In places the substratum is stratified. Some areas have slopes of less than 2 percent or more than 6 percent. A few areas are severely eroded.

Typically, the surface layer of the Ayr soil is very dark grayish brown loamy fine sand about 8 inches thick. The subsurface layer is dark brown loamy fine sand about 9 inches thick. The subsoil is about 20 inches thick. It is dark yellowish brown and yellowish brown, very friable fine sand in the upper part; yellowish brown, very friable loamy fine sand in the next part; and brown, friable loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown loam. In some places the combined thickness of the sandy upper layers is less than 20 inches or more than 36 inches. In some areas, the surface soil is thinner or the surface layer is lighter colored. In a few places the surface layer is fine sandy loam. In some areas the lower part of the subsoil has gray mottles. In a few areas the substratum is stratified sands and loams. Some areas have slopes of less than 2 percent or more than 6 percent.

Included with these soils in mapping are small areas of the very poorly drained Barry and Wallkill soils in the lower positions on the landscape, the somewhat poorly drained Ridgeville and Sumava soils in the slightly lower positions, and the excessively drained Sparta soils in landscape positions similar to those of the major soils. Also included are some areas that have stones on the surface. The stones are as much as 1 foot in diameter. Included areas make up about 8 percent of the map unit.

The available water capacity is moderate in the Octagon and Ayr soils. Permeability is moderate in the solum of the Octagon soil and moderately slow in the substratum. It is rapid in the upper part of solum in the Ayr soil and moderate in the lower part of the solum and in the substratum. The content of organic matter is moderate in the surface layer of the Octagon soil and moderately low in the surface layer of the Ayr soil. Surface runoff is medium on the Octagon soil and slow on the Ayr soil.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

The Octagon soil is well suited to corn, soybeans, and small grain. The Ayr soil is fairly well suited. The hazards of erosion and soil blowing are the main management concerns. Erosion and soil blowing can be controlled by crop rotation, critical-area plantings, terraces, diversions, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and conservation tillage systems that leave a protective cover of crop residue on the surface. Grassed waterways help to control erosion in drainageways. In areas where hillside seepage occurs,

subsurface drains should be installed. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments in areas of the Ayr soil. Droughtiness is a concern in areas of the Ayr soil. Irrigation systems reduce seasonal crop stress and increase crop yields. Cover crops, green manure crops, and crop residue management maintain tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. These soils are well suited to ridge-till and no-till cropping systems.

These soils are well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Controlling erosion, runoff, and soil blowing is the main management concern. Overgrazing and grazing when the soil is too wet are also concerns. Overgrazing increases the hazards of erosion and soil blowing and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, causes excessive runoff, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes slows runoff and helps to control soil blowing and erosion. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control erosion and soil blowing, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the shrink-swell potential, the Octagon soil is moderately limited as a site for dwellings. The Ayr soil is suitable as a site for dwellings. The construction of foundations, footings, and basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete.

Because of low strength and the shrink-swell potential, the Octagon soil is moderately limited as a site for local roads and streets. Because of the potential for frost action, the Ayr soil is also moderately limited as a site for local roads and streets. The upper soil layers should be replaced or strengthened with a more suitable base material. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by low strength and by frost action.

Because of the restricted permeability, the Octagon soil is moderately limited as a site for septic tank absorption fields. The Ayr soil is severely limited because of poor filtering qualities. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the poor filtering capacity of the Ayr soil. Enlarging the filter field improves the absorption of liquid waste and helps to overcome the restricted permeability.

The land capability classification is IIe for the Octagon soil and IIIe for the Ayr soil. No woodland ordination symbol is assigned.

OnA—Onarga fine sandy loam, moderately wet, 0 to 2 percent slopes. This very deep, nearly level, moderately well drained soil is on convex rises and knolls. Individual areas are dominantly irregularly shaped and range from 3 to 50 acres in size. The dominant size is about 15 acres.

Typically, the surface layer is black fine sandy loam about 10 inches thick. The subsurface layer is very dark grayish brown fine sandy loam about 6 inches thick. The subsoil is about 32 inches thick. It is dark yellowish brown, friable fine sandy loam in the upper part and yellowish brown, mottled, friable fine sandy loam in the lower part. The underlying material to a depth of about 60 inches is yellowish brown, mottled, stratified sand, fine sandy loam, and fine sand. Some areas have slopes of more than 2 percent. In a few places the depth to the underlying material is more than 50 inches. In a few areas, clay is in the lower part of the subsoil and the substratum is not stratified. In some places the surface layer contains more sand.

Included with this soil in mapping are small areas of the somewhat poorly drained Ridgeville soils. These soils are slightly lower on the landscape than the Onarga soil. They make up about 5 percent of the map unit.

The available water capacity is moderate in the Onarga soil. Permeability is moderately rapid in the solum and rapid in the substratum. The content of organic matter in the surface layer is moderate. Runoff is slow. The seasonal high water table is at a depth of 2.5 to 6.0 feet from late fall through spring.

Most areas are used for cultivated crops. Some small areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Droughtiness and the hazard of soil blowing are the main management concerns. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, using cover crops and green manure crops, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Irrigation systems reduce seasonal crop stress and increase crop yields. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. Cover crops, green manure

crops, and crop residue management maintain tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to the no-till cropping system.

This soil is well suited to grasses and legumes, such as bromegrass and alfalfa, for hay or pasture. Droughtiness and the hazard of soil blowing are the main management concerns. Overgrazing and grazing during wet periods are also management concerns. Overgrazing increases the hazard of soil blowing and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Irrigation can reduce droughtiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Deep-rooted legumes and drought-tolerant species are best suited. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control soil blowing, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is suitable as a site for dwellings without basements. It is moderately limited as a site for dwellings with basements because of wetness. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness.

Because of the potential for frost action, this soil is moderately limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action. Providing coarse grained subgrade or base material also helps to prevent the damage caused by frost action.

Because of the wetness, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling and mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness.

The land capability classification is IIs. No woodland ordination symbol is assigned.

OnB2—Onarga fine sandy loam, moderately wet, 2 to 6 percent slopes, eroded. This very deep, gently sloping, moderately well drained soil is on convex rises and knolls. Individual areas are dominantly irregularly shaped and range from 3 to 50 acres in size. The dominant size is about 15 acres.

Typically, the surface layer is dark brown fine sandy loam mixed with dark brown sandy loam from the subsoil. It is about 10 inches thick. The subsoil is dark brown and yellowish brown, friable sandy loam about 40 inches thick. It is mottled in the lower part. The substratum to a depth of about 60 inches is brown, mottled loamy fine sand that has strata of fine sandy loam. Some areas have slopes of less than 2 percent or more than 6 percent. In a few places the depth to the underlying material is more than 50 inches. In a few areas, the lower part of the subsoil has less clay and the substratum is not stratified. In some places the surface layer is lighter colored. In other places the surface layer contains more sand.

Included with this soil in mapping are a few areas of the somewhat poorly drained Ridgeville soils. These soils are slightly lower on the landscape than the Onarga soil. Also included are a few areas of moderately well drained, severely eroded soils on the steeper slopes. Included soils make up about 5 percent of the map unit.

The available water capacity is moderate in the Onarga soil. Permeability is moderately rapid in the solum and rapid in the substratum. The content of organic matter in the surface layer is moderate. Runoff is medium. The seasonal high water table is at a depth of 2.5 to 6.0 feet from late fall through spring.

Most areas are used for cultivated crops. Some small areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Droughtiness and the hazards of erosion and soil blowing are the main management concerns. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, a system of conservation tillage that leaves a protective cover of crop residue on the surface, cover crops, green manure crops, grade-stabilization structures, critical-area plantings, and crop rotation. Grassed waterways help to control erosion in drainageways. Using a cropping system that includes close-growing crops helps to control erosion. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Irrigation systems reduce seasonal crop stress and increase crop yields. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. Cover crops, green manure crops, and crop residue management maintain tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is

well suited to the no-till cropping system.

This soil is well suited to grasses and legumes, such as bromegrass and alfalfa, for hay or pasture. Droughtiness, the hazards of soil blowing and erosion, and excess runoff are management concerns. Overgrazing and grazing during wet periods are additional concerns. Overgrazing increases the hazard of soil blowing and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, causes excessive runoff, reduces forage yields, damages the sod, and reduces plant density and hardiness. Irrigation can reduce droughtiness. Maintaining a permanent cover of grasses and legumes slows runoff and helps to control erosion and soil blowing. Deep-rooted legumes and drought-tolerant species are best suited to this soil. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control soil blowing and erosion, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is suitable for dwellings without basements. It is moderately limited as a site for dwellings with basements because of wetness. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Constructing the dwellings on raised, well compacted fill material also helps to overcome the wetness.

Because of the potential for frost action, this soil is moderately limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action. Providing coarse grained subgrade or base material also helps to prevent the damage caused by frost action.

Because of the wetness, this soil is severely limited as a site for septic tank absorption fields. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness. Installing perimeter drains around the filter field helps to lower the water table.

The land capability classification is IIe. No woodland ordination symbol is assigned.

OpB2—Onarga fine sandy loam, till substratum, 2 to 6 percent slopes, eroded. This very deep, gently sloping, moderately well drained soil is on slightly convex rises. Individual areas are irregularly shaped and range from 3 to 80 acres in size. The dominant size is about 25 acres.

Typically, the surface layer is very dark brown fine sandy loam mixed with dark brown fine sandy loam from the subsoil. It is about 9 inches thick. The subsoil is about 29 inches thick. It is dark brown, very friable fine sandy loam in the upper part; yellowish brown, friable fine sandy loam in the next part; and yellowish brown, friable sandy loam in the lower part. The substratum extends to a depth of about 60 inches. It is yellowish brown, mottled sand that has strata of fine sandy loam and loamy fine sand in the upper part and brown, mottled loam in the lower part. In places, the loamy part of the subsoil has less clay and the sand is not stratified in the upper part of the substratum. In some areas the surface layer is light colored. A few places have slopes of less than 2 percent or more than 6 percent. In some areas the surface layer contains more sand.

Included with this soil in mapping are some small areas of the somewhat poorly drained Ridgeville soils that have a till substratum. These soils are slightly lower on the landscape than the Onarga soil. Also included are a few areas of moderately well drained, severely eroded soils on the steeper slopes. Included soils make up about 4 percent of the map unit.

The available water capacity is moderate in the Onarga soil. Permeability is moderately rapid in the solum. It is rapid in the upper part of the substratum and moderately slow in the lower part. The content of organic matter in the surface layer is moderate. Runoff is medium. The seasonal high water table is at a depth of 3 to 6 feet from late fall through spring.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Erosion, soil blowing, and droughtiness are the main management concerns. Erosion and surface runoff can be controlled by crop rotation, critical-area plantings, terraces, diversions, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and conservation tillage systems that leave all or part of the crop residue on the surface. Grassed waterways help to control erosion in drainageways. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, using cover crops and green manure crops, ridging at an angle to the prevailing wind, or maintaining a permanent cover of vegetation. Irrigation systems reduce seasonal crop stress and increase crop yields. In areas where hillside seepage occurs, subsurface drains should be installed. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy

equipment is used near open excavations. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to the no-till cropping system.

This soil is well suited to grasses and legumes, such as bromegrass and alfalfa, for hay or pasture. Soil blowing, droughtiness, erosion, and runoff are management concerns. Overgrazing and grazing during wet periods are also major concerns. Overgrazing increases the hazard of soil blowing and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, causes excessive runoff, reduces forage yields, damages the sod, and reduces plant density and hardiness. Irrigation can reduce droughtiness. Maintaining a permanent cover of grasses and legumes slows runoff and helps to control erosion and soil blowing. Deep-rooted legumes and drought-tolerant species are best suited to this soil. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control soil blowing and erosion, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is suitable as a site for dwellings without basements. It is moderately limited as a site for dwellings with basements because of wetness. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness.

Because of the potential for frost action, this soil is moderately limited as a site for local roads and streets. Providing coarse grained subgrade or base material helps to prevent the damage caused by frost action. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action.

This soil is severely limited as a site for septic tank absorption fields because of poor filtering qualities, the restricted permeability, and the wetness. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness.

The land capability classification is IIe. No woodland ordination symbol is assigned.

OrB—Ormas loamy sand, sandy substratum, 1 to 4 percent slopes. This very deep, nearly level to gently sloping, well drained soil is on convex ridges or knolls on outwash plains. Individual areas are irregularly shaped and range from 3 to 40 acres in size. The dominant size is about 10 acres.

Typically, the surface layer is dark brown loamy sand about 10 inches thick. The subsurface layer is brown loamy sand about 14 inches thick. The subsoil is brown, friable gravelly sandy loam about 21 inches thick. The substratum to a depth of about 60 inches is pale brown loamy sand that has strata of coarse sand. In some areas the lower part of the solum has textural bands of sandy loam. In other areas the subsoil contains more clay. In a few places, the surface layer is dark and less sand is in the upper part of the solum. In some areas the soil has more sand throughout. In other areas the soil does not contain gravel. A few places have slopes of less than 1 percent. In a few areas the depth to the substratum is less than 45 inches.

Included with this soil in mapping are a few small areas of the somewhat poorly drained Seafield soils. These soils are in the lower lying areas. Also included are areas of the moderately well drained Glenhall soils in the slightly lower positions on the landscape. Included soils make up about 6 percent of the map unit.

The available water capacity is moderate in the Ormas soil. Permeability is rapid in the upper part of the solum, moderately rapid in the lower part of the solum, and very rapid in the underlying material. The content of organic matter in the surface layer is moderately low. Runoff is slow.

Most areas are used for cultivated crops. A few areas are used for woodland or pasture.

This soil is fairly well suited to corn, soybeans, and small grain. Droughtiness and soil blowing are the main concerns. Irrigation systems reduce seasonal crop stress and increase crop yields. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Crop residue management, green manure crops, and cover crops help to maintain tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to the no-till cropping system.

This soil is well suited to grasses and legumes, such as bromegrass and alfalfa, for hay and pasture. Soil blowing and droughtiness are hazards. Overgrazing and grazing during wet periods are also major management concerns. Overgrazing increases the hazard of soil blowing and reduces plant density and hardiness. Grazing during wet periods causes surface compaction,

which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Irrigation can reduce droughtiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Deep-rooted legumes and drought-tolerant species are best suited. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control soil blowing, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is well suited to trees. Seedling mortality and plant competition are the main management concerns. Planting more trees than is necessary can compensate for seedling mortality, but thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock or larger planting stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Pines, which have a deep taproot system, generally grow well on this soil. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

This soil is suitable as a site for dwellings.

Because of the potential for frost action, this soil is moderately limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action. Providing coarse grained subgrade or base material also helps to prevent the damage caused by frost action.

Because of poor filtering qualities, this soil is severely limited as a site for septic tank absorption fields. The soil readily absorbs but does not adequately filter the effluent from septic tanks. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the poor filtering capacity.

The land capability classification is IIIs. The woodland ordination symbol is 4S.

PaA—Papineau fine sandy loam, 0 to 1 percent slopes. This very deep, nearly level, somewhat poorly drained soil is on slightly convex rises. Individual areas are typically irregular in shape and range from 5 to 60 acres in size. The dominant size is about 15 acres.

Typically, the surface layer is very dark gray fine sandy loam about 10 inches thick. The subsoil is about 33 inches thick. It is yellowish brown and brown, mottled, friable clay loam in the upper part and yellowish brown, mottled, firm silty clay in the lower part. The substratum to a depth of about 60 inches is brown, mottled silty clay. In places the upper part of the solum contains more clay or more sand.

Included with this soil in mapping are a few small areas of the very poorly drained Iroquois soils. These soils are lower on the landscape than the Papineau soil. Also included are areas of the moderately well drained Simonin soils in the higher positions. Included soils make up about 10 percent of the map unit.

The available water capacity is moderate in the Papineau soil. Permeability is moderate in the upper part of the subsoil and is slow in the lower part of the subsoil and in the substratum. The content of organic matter in the surface layer is moderate. Surface runoff is slow. The seasonal high water table is at a depth of 1 to 3 feet from late winter through spring.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness and soil blowing are the main management concerns. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring, thus allowing the planting of longer season varieties of adapted crops. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Because of the clayey subsoil, the tiles in a subsurface drainage system should be closely spaced. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to ridge-till and no-till cropping systems.

This soil is well suited to grasses and legumes, such as orchardgrass and ladino clover, for hay and pasture. Soil blowing, excess water, and frost heaving are management concerns. Excess water can be removed by surface drains, subsurface drains, or a combination of these practices. Overgrazing and grazing during wet periods are also major concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a

permanent cover of grasses and legumes helps to control soil blowing. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted legumes. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of wetness, this soil is severely limited as a site for dwellings. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building dwellings on elevated, well compacted fill material also helps to overcome the wetness.

Because of the potential for frost action, this soil is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost damage. Providing coarse grained subgrade or base material also helps to prevent the damage caused by frost action.

Because of the wetness and the restricted permeability, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the restricted permeability.

The land capability classification is IIw. No woodland ordination symbol is assigned.

PaB—Papineau fine sandy loam, 1 to 3 percent slopes. This very deep, nearly level to gently sloping, somewhat poorly drained soil is on slightly convex rises. Individual areas are typically irregular in shape and range from 5 to 45 acres in size. The dominant size is about 15 acres.

Typically, the surface layer is black fine sandy loam about 7 inches thick. The subsurface layer is very dark grayish brown fine sandy loam about 4 inches thick. The subsoil is about 19 inches thick. It is brown and yellowish brown, friable clay loam in the upper part; brown, mottled, friable clay loam in the next part; and olive brown, mottled, firm silty clay in the lower part. The substratum extends to a depth of about 60 inches. It is light olive brown, mottled silty clay in the upper part and grayish brown silty clay in the lower part. In places the upper part of the solum contains more clay or more sand.

Included with this soil in mapping are small areas of the very poorly drained Bryce soils. These soils are lower on the landscape than the Papineau soil. Also included are small areas of the moderately well drained Swygert Variant and Simonin soils in the higher positions on the landscape. Included soils make up about 10 percent of the map unit.

The available water capacity is moderate in the Papineau soil. Permeability is moderate in the upper part of the subsoil and is slow in the lower part of the subsoil and in the substratum. The content of organic matter in the surface layer is moderate. Surface runoff is slow. The seasonal high water table is at a depth of 1 to 3 feet from late winter through spring.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness, soil blowing, and erosion are the main management concerns. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring, thus allowing the planting of longer season varieties of adapted crops. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Because of the clayey subsoil, subsurface drain tiles should be closely spaced. Erosion and surface runoff can be controlled by crop rotation, critical-area plantings, terraces, diversions, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and a system of conservation tillage that leaves a protective cover of crop residue on the surface. Grassed waterways help to control erosion in drainageways. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to ridge-till and no-till cropping systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Erosion, runoff, soil blowing, and frost heaving are management concerns. Overgrazing and grazing during wet periods are also major concerns. Overgrazing increases the hazards of erosion and soil blowing and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, causes excessive runoff, reduces forage yields, damages the sod, and reduces plant density and hardiness. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops.

Maintaining a permanent cover of grasses and legumes slows runoff and helps to control soil blowing and erosion. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control erosion, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of wetness, this soil is severely limited as a site for dwellings. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness.

Because of the potential for frost action, this soil is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action. Providing coarse grained subgrade or base material also helps to prevent the damage caused by frost action.

Because of the wetness and the restricted permeability, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the restricted permeability.

The land capability classification is IIw. No woodland ordination symbol is assigned.

Pp—Peotone silty clay loam, pothole. This very deep, nearly level, very poorly drained soil is in depressional areas and potholes. It is frequently ponded for very long periods by surface runoff from adjacent soils. Individual areas are dominantly oval or round, but some are irregularly shaped. The areas range from 3 to 40 acres in size. The dominant size is about 5 acres.

Typically, the surface layer is black silty clay loam about 11 inches thick. The subsurface layer also is black silty clay loam. It is about 23 inches thick. The subsoil is mottled, firm silty clay loam about 17 inches thick. The upper part is dark gray, and the lower part is olive gray. The substratum to a depth of about 60 inches is grayish brown, mottled silty clay loam. In a few places the dark surface layer is less than 24 inches thick. In other areas the dark surface layer is more than 36 inches thick. In some places loamy or clayey glacial till is in the substratum. In other places the substratum contains marl. In a few areas the solum contains less clay, the surface soil is thinner, or the soil is underlain by organic deposits. Some areas have slopes of more than 2 percent.

Included with this soil in mapping are some small areas of the moderately well drained Montmorenci soils. These soils are at the edge of the mapped areas in landscape positions higher than those of the Peotone soil. They make up about 2 percent of the map unit.

The available water capacity is high in the Peotone soil. Permeability is slow in the solum and moderately slow in the substratum. The content of organic matter in the surface layer is high. Runoff is very slow or ponded. The water table is at or above the surface from late winter through early summer.

Most areas are used for cultivated crops. A few areas are used as wetland wildlife habitat.

If managed properly, this soil is fairly well suited to corn and soybeans. Wetness and ponding are the main management concerns. The surface layer is firm. If it is tilled when wet, large clods form. The clods become hard when they dry. This cloddiness makes preparing a seedbed difficult. Plant growth and development are frequently inhibited by excess water. The high water table disrupts normal root growth and commonly results in a shallow rooting system. Thus, some plants mature slowly and may be drowned out by ponding. If small grain is planted in the fall, it is subject to severe damage during periods of prolonged ponding. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring. Where adequate outlets are available, the soil can be drained with an open inlet pipe combined with subsurface drainage. A pumping system can be used in areas that do not have a suitable outlet. Because of the clayey subsoil, the tile lines in subsurface drainage systems should be closely spaced. Conservation practices, such as a system of conservation tillage that leaves a protective cover of crop residue on the surface, cover crops, and green manure crops, help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is suited to fall plowing and fall chiseling.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. The ponding, frost heaving, and excess water are management concerns. Overgrazing and grazing during wet periods are also major concerns. Water management practices, such as drainage, are necessary for high yields of hay and pasture. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Water-tolerant species are best suited to this soil. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted legumes. Proper stocking

rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the ponding, this soil is generally unsuited to dwellings and sanitary facilities. Because of the ponding, low strength, and the shrink-swell potential, it is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to minimize the ponding and prevent the damage caused by frost action. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength, shrinking and swelling, and frost action.

The land capability classification is IIIw. No woodland ordination symbol is assigned.

Pt—Pits, quarry. This map unit consists of areas from which limestone bedrock, sand, or gravel has been removed (fig. 12). The sand and gravel are generally excavated from ridges and knolls. Limestone from the quarries is crushed and is used for roads and agricultural lime. Sand and gravel excavated from these areas are used primarily as fill material or as a sub-base for roads. The resulting pits are approximately 85 feet deep, have nearly vertical walls, and range from 5 to 40 acres in size.

The soils in this map unit support very little vegetation. They have severe limitations affecting all engineering uses. With proper management, abandoned pits could be used as recreational areas or wildlife habitat.

No land capability classification or woodland ordination symbol is assigned.

Pu—Prochaska loamy sand, rarely flooded. This very deep, nearly level, very poorly drained soil is on flood plains along Beaver Creek. It is rarely flooded for very brief periods. It is frequently ponded for brief periods by surface runoff from adjacent soils. The soil is in broad depressional areas on bottom land. Individual areas are broad and elongated. They range from 20 to 600 acres in size. The typical size is about 300 acres.

Typically, the surface layer is black loamy sand about 10 inches thick. The subsoil is very friable loamy sand about 19 inches thick. It is gray in the upper part and grayish brown and mottled in the lower part. The substratum to a depth of about 60 inches is pale brown, grayish brown, and light brownish gray, mottled sand. In some areas the surface layer is mucky loamy sand. In places the soil contains more clay in the upper part of the profile. In a few areas small amounts of iron accumulations and concretions are in the surface layer and the upper part of the subsoil. In other areas iron stains tend to mask the gray colors. In some places a layer of loam or clay loam is in the subsoil. In other places the lower part of the subsoil and the substratum are fine sand.

Included with this soil in mapping are a few small areas of the somewhat poorly drained Algansee soils. These soils are slightly higher on the landscape than the Prochaska soil. They make up about 2 percent of the map unit.

The available water capacity is low in the Prochaska soil. Permeability is rapid. The content of organic matter in the surface layer is moderate. Runoff is very slow or ponded. The water table is at or above the surface from fall through spring.

Most areas are drained and are used for cultivated crops. A few areas are used as woodland or pasture.

This soil is fairly well suited to corn, soybeans, and small grain. Wetness, ponding, soil blowing, and droughtiness are the main management concerns. Drainage helps to lower the water table and raises the temperature of the soil more quickly in the spring. The wetness and the ponding can be overcome by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Pumping can be used in areas where a suitable outlet is not available. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open ditches. Drained areas are frequently droughty during the summer months. Water management practices, such as subsurface irrigation, can be used to minimize the effects of droughtiness and to increase crop yields. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Cover crops, green manure crops, and crop residue management help to maintain or improve the content of organic matter. This soil is well suited to the ridge-till cropping system.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Ponding, droughtiness, soil blowing, frost heaving, and excess water are management concerns. The excess water can be removed by surface drains, subsurface drains, pumping, or a combination of these practices. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface

Figure 12.—This area of Pits, quarry, is used as a source of crushed stone and agricultural lime.

drainage. Ponded areas hinder the use of equipment, and machinery bogs down in this soil when it is wet. Irrigation can reduce droughtiness. Overgrazing and grazing during wet periods are also major management concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Water-tolerant species are best suited. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted legumes. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is fairly well suited to trees. The main management concerns are equipment limitations, seedling mortality, the windthrow hazard, and plant competition. The equipment limitations can be overcome by delaying timber harvest until dry periods

or until the soil is frozen. Planting more trees than is necessary can compensate for seedling mortality, but thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock or planting larger stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Selecting water-tolerant species helps to overcome the windthrow hazard. Harvest methods that do not leave the remaining trees isolated or widely spaced should be used. Care should be taken to avoid damaging the surficial root systems of unharvested trees. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, and girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the flooding and the ponding, this soil is generally unsuitable as a site for dwellings and sanitary facilities. Because of the ponding, it is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to overcome the ponding.

The land capability classification is IIIw. The woodland ordination symbol is 4W.

Px—Prochaska loamy sand, frequently flooded. This very deep, nearly level, very poorly drained soil is frequently flooded for long periods. It is also frequently ponded for long periods by runoff from adjacent soils. The soil is in broad depressional areas on bottom land. Individual areas are broad and irregularly shaped. They range from 20 to 600 acres in size. The typical size is about 100 acres.

Typically, the surface layer is black loamy sand about 9 inches thick. The subsurface layer also is black loamy sand. It is about 10 inches thick. The subsoil is about 14 inches thick. It is dark gray, black, and grayish brown, mottled, very friable loamy sand. The substratum to a depth of about 60 inches is grayish brown and gray, mottled sand. In places the surface layer is mucky loamy sand. In some areas the soil contains more clay in the upper part of the profile. In a few places small amounts of iron accumulations and concretions are in the surface layer and the upper part of the subsoil. In some areas iron stains tend to mask the gray colors. In some places the subsoil has a layer of loam or clay loam. In other places the lower part of the subsoil and the substratum are fine sand.

Included with this soil in mapping are a few small areas of the somewhat poorly drained Algansee soils. These soils are slightly higher on the landscape than the Prochaska soil. They make up about 3 percent of the map unit.

The available water capacity is low in the Prochaska soil. Permeability is rapid. The content of organic matter in the surface layer is moderate. Runoff is very slow or ponded. The seasonal high water table is at or above the surface from fall through spring.

Most areas are drained and are used for cultivated crops.

This soil is fairly well suited to corn and soybeans. Wetness, ponding, flooding, and soil blowing are the main management concerns. If small grain is planted in the fall, it is subject to severe damage during periods of prolonged flooding. Planting short-season varieties of adapted crops in late spring helps to prevent crop damage or loss caused by flooding. Some areas can be protected from flooding by dikes and levees, but the proper construction of these structures is extremely expensive. The flooding and the wetness can be overcome by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Pumping can be used in areas where a suitable outlet is not available. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open ditches. Drained areas are frequently droughty during the summer months. Water management practices, such as subsurface irrigation, can be used to minimize the effects of droughtiness and to increase crop yields. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Cover crops, green manure crops, and crop residue management help to maintain or improve the content of organic matter.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Ponding, soil blowing, droughtiness, and flooding are hazards. Frost heaving, excess water, overgrazing, and grazing during wet periods are also major management concerns. Water management practices, such as drainage and irrigation, are necessary for high yields of hay and pasture. Some areas can be protected from flooding by dikes and levees. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant

density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Water-tolerant species are best suited to this soil. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted legumes. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is fairly well suited to trees. The main management concerns are equipment limitations, seedling mortality, the windthrow hazard, and plant competition. The flooding may hinder harvesting and logging activities and the planting of seedlings. The equipment limitations can be overcome by delaying timber harvest until dry periods or until the soil is frozen. Planting more trees than is necessary helps to overcome seedling mortality, but thinning may be required later. Seedling mortality can also be reduced by using containerized stock or planting larger stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Selecting water-tolerant species helps to overcome the windthrow hazard. Harvest methods that do not leave the remaining trees isolated or widely spaced should be used. Care should be taken to avoid damaging the surficial root systems of unharvested trees. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, and girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the flooding and the ponding, this soil is generally unsuitable as a site for dwellings and sanitary facilities and is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to overcome the flooding and the ponding.

The land capability classification is IIIw. The woodland ordination symbol is 4W.

Py—Prochaska loamy sand, frequently flooded, undrained. This very deep, nearly level, very poorly drained soil is frequently flooded for long periods. It is frequently ponded for very long periods by runoff from adjacent soils. The soil is in broad depressional areas on bottom land. Individual areas are broad and irregularly shaped and range from 20 to 200 acres in size. The dominant size is about 80 acres.

Typically, the surface layer is black loamy sand about 8 inches thick. The subsurface layer is very dark grayish brown loamy sand about 9 inches thick. The subsoil is gray, very friable loamy sand about 16 inches thick. The substratum to a depth of about 60 inches is light brownish gray sand. In some areas the surface layer is mucky loamy sand. In a few places small amounts of iron accumulations or concretions are in the surface layer and the upper part of the subsoil. In other places iron stains tend to mask the gray colors. In some areas the subsoil has a layer of loam or clay loam. In some places the lower part of the subsoil and the substratum are fine sand. In other places the soil contains more clay in the upper part of the profile.

Included with this soil in mapping are small areas of the somewhat poorly drained Algansee soils. These soils are slightly higher on the landscape than the Prochaska soil. They make up about 2 percent of the map unit.

The available water capacity is low in the Prochaska soil. Permeability is rapid. The content of organic matter in the surface layer is moderate. Runoff is very slow or ponded. The seasonal high water table is at or above the surface from fall through spring.

Most areas are used as wetland wildlife habitat. They are covered with aquatic and semiaquatic vegetation, such as cattails, rushes, sedges, waterlilies, pondweed, duckweed, spatterdock, and water-tolerant trees and shrubs. These plants provide cover, nesting areas, and food for ducks, geese, and other birds. Areas of this soil also provide habitat for furbearing animals and other kinds of wildlife. These areas are flooded manually for very long periods. The flooding provides habitat for wetland wildlife.

This soil is generally unsuited to corn, soybeans, small grain, and hay crops and is poorly suited to pasture. The flooding and the ponding are the main management concerns. Installing any type of drainage system for the production of cultivated crops would require major land reclamation efforts.

This soil is fairly well suited to trees. The main management concerns are equipment limitations, seedling mortality, the windthrow hazard, and plant competition. The flooding may hinder harvesting and logging operations and the planting of seedlings. The equipment limitations can be overcome by delaying timber harvest until dry periods or until the soil is frozen. Planting more trees than is necessary helps to overcome seedling mortality, but thinning may be required later. Seedling mortality can also be reduced by using containerized stock or planting larger stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Selecting water-tolerant

species helps to overcome the windthrow hazard. Harvest methods that do not leave the remaining trees isolated or widely spaced should be used. Care should be taken to avoid damaging the surficial root systems of unharvested trees. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the flooding and the ponding, this soil is generally unsuitable as a site for dwellings and sanitary facilities and is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to overcome the flooding and the ponding.

The land capability classification is Vw. The woodland ordination symbol is 4W.

RtA—Ridgeville fine sandy loam, 0 to 2 percent slopes. This very deep, nearly level, somewhat poorly drained soil is on slightly convex rises. Areas are irregularly shaped and range from 3 to 40 acres in size. The dominant size is about 15 acres.

Typically, the surface layer is very dark brown fine sandy loam about 10 inches thick. The subsoil is dark brown, yellowish brown, and light brownish gray, mottled, very friable fine sandy loam about 30 inches thick. The substratum to a depth of about 60 inches is yellowish brown and light brownish gray, mottled fine sand that has strata of sandy loam and loamy fine sand. In some areas, the dark surface layer is thinner or the surface layer is light colored. In places the subsoil and the substratum contain less sand and more clay. In some areas the solum contains more sand.

Included with this soil in mapping are small areas of the very poorly drained Gilford soils in the lower positions on the landscape; areas of the well drained Ayr and moderately well drained Ayrmount and Onarga soils in the higher lying areas; and areas of the somewhat poorly drained Odell and Sumava soils in the slightly higher positions. Odell soils have less sand in the upper part of the subsoil than the Ridgeville soil, and Sumava soils have less sand in the lower part of the subsoil. Included soils make up about 15 percent of the map unit.

The available water capacity is moderate in the Ridgeville soil. Permeability is moderate in the upper part of the solum and moderately rapid in the lower part of the solum and in the substratum. The content of organic matter in the surface layer is moderate. Runoff is slow. The seasonal high water table is at a depth of 1 to 3 feet from late winter through spring.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness, soil blowing, and droughtiness are the main management concerns. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring. The wetness can be reduced by controlling the water table with open ditches, surface drains, and subsurface drains. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Irrigation systems reduce seasonal crop stress and increase crop yields. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to no-till and ridge-till cropping systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Soil blowing, droughtiness, excess water, and frost heaving are management concerns. The excess water can be removed by surface drains, subsurface drains, or a combination of these practices. Irrigation can reduce droughtiness. Overgrazing and grazing during wet periods are also major concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of wetness, this soil is severely limited as a site for dwellings. Adequate surface and subsurface drainage helps to overcome the wetness. Landscaping that removes runoff, surface drains, and foundation drains help to lower the water table and help to overcome the wetness. Building houses on elevated,

well compacted fill material also helps to overcome the wetness.

Because of the potential for frost action, this soil is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action.

Because of the wetness, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness.

The land capability classification is IIs. No woodland ordination symbol is assigned.

RuA—Ridgeville fine sandy loam, till substratum, 0 to 2 percent slopes. This very deep, nearly level, somewhat poorly drained soil is on slightly convex rises. Individual areas are irregularly shaped and range from 3 to 50 acres in size. The dominant size is about 10 acres.

Typically, the surface soil is very dark grayish brown fine sandy loam about 13 inches thick. The subsoil is about 33 inches thick. It is dark grayish brown, mottled, friable fine sandy loam in the upper part; brown, mottled, friable sandy loam in the next part; and pale brown, mottled, very friable sandy loam in the lower part. The substratum extends to a depth of about 60 inches. The upper part is pale brown, mottled loamy sand that has thin strata of sandy loam, and the lower part is brown loam. In some areas, the dark surface layer is thinner or the surface layer is light colored. In places the subsoil and the substratum contain less sand and more clay. In some areas the solum contains more sand. A few areas have slopes of more than 2 percent.

Included with this soil in mapping are small areas of the very poorly drained Gilford soils in the lower positions on the landscape; small areas of the moderately well drained Onarga soils that have a till substratum and the moderately well drained Ayrmount soils in the higher positions; and the somewhat poorly drained Odell and Sumava soils in the slightly higher positions. Odell soils have less sand in the upper part of the subsoil than the Ridgeville soil, and Sumava soils have less sand in the lower part of the subsoil. Included soils make up about 15 percent of the map unit.

The available water capacity is moderate in the Ridgeville soil. Permeability is moderate or moderately rapid in the upper part of the solum and moderately rapid in the lower part. It is moderately rapid in the upper part of the substratum and moderately slow in the lower part. The content of organic matter in the surface layer is moderate. Runoff is slow. The seasonal high water table is at a depth of 1 to 3 feet from winter through spring.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness, soil blowing, and droughtiness are the main management concerns. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring. The wetness can be reduced by controlling the water table with open ditches, surface drains, and subsurface drains. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Irrigation systems reduce seasonal crop stress and increase crop yields. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to no-till and till-plant cropping systems.

This soil is well suited to grasses and legumes, such as orchardgrass and ladino clover, for hay and pasture. Soil blowing, droughtiness, excess water, and frost heaving are management concerns. The excess water can be removed by surface drains, subsurface drains, or a combination of these practices. Irrigation can reduce droughtiness. Overgrazing and grazing during wet periods are also major concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of wetness, this soil is severely limited as a site for dwellings. Adequate surface and subsurface drainage helps to overcome the wetness. Surface drains, foundation drains, and landscaping that removes

runoff help to lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness.

Because of the potential for frost action and the wetness, this soil is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action and by wetness.

Because of the wetness and the restricted permeability, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling and mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the restricted permeability and the wetness.

The land capability classification is IIw. No woodland ordination symbol is assigned.

Rv—Ross silt loam, frequently flooded. This very deep, nearly level, well drained soil is on swells in areas of bottom land. It is frequently flooded for very brief to long periods. Individual areas are elongated and range from 3 to about 75 acres in size. The dominant size is about 30 acres.

Typically, the surface layer is black silt loam about 9 inches thick. The subsurface layer is very dark brown silt loam about 7 inches thick. The subsoil is about 23 inches thick. The upper part is dark brown, friable silt loam, and the lower part is brown, friable loam. The substratum extends to a depth of about 60 inches. It is dark brown loam in the upper part and brown very fine sandy loam in the lower part. In many places the dark upper part of the solum is less than 24 inches thick. In a few of those areas, the solum contains more clay. In places the soil contains less clay throughout. In a few areas the soil has mottles in the lower part. In a few places the soil has strata of sand and loamy sand.

Included with this soil in mapping are some small areas of the very poorly drained Sawabash soils in the lower lying areas and a few areas of the moderately well drained Martinsville soils on adjacent slopes. Also included, in sloughs, are some areas of somewhat poorly drained soils that have textures similar to those of the Ross soil. Included soils make up about 5 percent of the map unit.

The available water capacity is high in the Ross soil. Permeability is moderate. The content of organic matter in the surface layer is high. Runoff is slow. The seasonal high water table is at a depth of 4 to 6 feet from late winter through early spring.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

This soil is well suited to corn and soybeans. Flooding is the main management concern. If small grain is planted in the fall, it is subject to severe damage during periods of prolonged flooding. Because of the flooding, planting may be delayed or replanting of corn and soybeans may be necessary. Short-season varieties of adapted crops should be selected. Levees and upstream flood-control measures can be used, but the proper construction of these structures is extremely expensive. Cover crops, green manure crops, and a system of conservation tillage that leaves a protective cover of crop residue on the surface help to maintain tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to spring plow, spring chisel, and no-till cropping systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay or pasture. The flooding is the main management concern. Shallow-rooted legumes that are tolerant of flooding are best suited to this soil. Overgrazing and grazing during wet periods are also major concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the flooding, this soil is generally unsuitable as a site for dwellings and sanitary facilities and is severely limited as a site for local roads. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts reduce the hazard of flooding.

The land capability classification is IIw. The woodland ordination symbol is 5A.

Sd—Sawabash silty clay loam, frequently flooded, undrained. This very deep, nearly level, very poorly drained soil is in broad depressional areas and in old stream channels on bottom land. It is frequently flooded for long periods. It is also frequently ponded for very long periods by runoff from adjacent soils. Individual

areas are dominantly elongated, but some areas are irregularly shaped. The areas range from 300 to more than 500 acres in size. The dominant size is about 400 acres.

Typically, the surface layer is black silty clay loam about 12 inches thick. The subsurface layer is silty clay loam about 23 inches thick. It is black in the upper part, black and mottled in the next part, and very dark gray and mottled in the lower part. The substratum extends to a depth of about 60 inches. It is gray, mottled silty clay loam in the upper part and grayish brown, mottled silt loam in the lower part. In places the dark surface soil is less than 24 inches thick. In many small areas the soil contains more sand and less silt throughout. In some places the soil contains more clay.

Included with this soil in mapping are a few small areas of the well drained Martinsville, Miami, and Ross soils. Martinsville and Miami soils are on adjacent slopes. Ross soils are on adjacent slopes and in the slightly higher areas on the flood plain. Included soils make up about 4 percent of the map unit.

The available water capacity is high in the Sawabash soil. Permeability is moderate. The content of organic matter in the surface layer is high. Runoff is very slow or ponded. The water table is at or above the surface from late fall through spring.

Most areas are used as unimproved pasture or as woodland. Pastured areas support water-tolerant grasses, and woodlots support water-tolerant trees, such as eastern cottonwood, pin oak, sycamore, and willow. A few small areas are used for cultivated crops or hay.

This soil is generally unsuited to corn, soybeans, small grain, and hay and is poorly suited to pasture (fig. 13). The flooding and the ponding are the main management concerns. Most areas are too narrow for drainage systems or flood-control measures.

This soil is well suited to wetland wildlife habitat. It is frequently flooded by backwater from adjacent streams and drainageways. Many areas are covered with aquatic and semiaquatic vegetation, such as cattails, rushes, sedges, waterlilies, pondweed, duckweed, spatterdock, and water-tolerant trees and shrubs. These plants provide cover, nesting, and food for many aquatic animals, including ducks, geese, and other birds. Areas of this soil also provide food and cover for wildlife, such as deer, fox, raccoons, and muskrat.

If this soil is used for hay or pasture, reed canarygrass and birdsfoot trefoil are the best suited species. The wetness prohibits the use of most deep-rooted legumes. Water management practices, such as drainage, are necessary for high yields of hay. Overgrazing reduces plant density and hardiness and causes surface compaction and poor tilth. Proper stocking rates, pasture rotation, timely deferment of grazing, restricted use during wet periods, and timely applications of nutrients help to keep the pasture in good condition.

This soil is well suited to trees. The main management concerns are equipment limitations, seedling mortality, and plant competition. The flooding may hinder harvesting and logging activities and the planting of seedlings. The equipment limitations can be overcome by delaying timber harvest until dry periods or until the soil is frozen. Planting more trees than is necessary can compensate for seedling mortality, but thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock or planting larger stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Water-tolerant species are best suited to this soil. Site preparation and the control or removal of unwanted tees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed tress.

Because of the flooding and the ponding, this soil is generally unsuited to dwellings and sanitary facilities. Because of the ponding, low strength, and the flooding, it is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to overcome the flooding and ponding. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength.

The land capability classification is Vw. The woodland ordination symbol is 5W.

SeA—Seafield fine sandy loam, 0 to 2 percent slopes. This very deep, nearly level, somewhat poorly drained soil is on slightly convex rises. Individual areas are irregularly shaped and range from 3 to 60 acres in size. The dominant size is about 15 acres.

Typically, the surface layer is very dark grayish brown fine sandy loam about 8 inches thick. The subsoil is about 23 inches thick. It is brown and gray, mottled, friable fine sandy loam in the upper part and light brownish gray, mottled, firm sandy clay loam in the lower part. The substratum to a depth of about 60 inches is light brownish gray and light gray, mottled fine sand. In some areas the dark surface layer is thicker. In some places the subsoil contains more clay. In other places the solum contains more sand. In a few areas the upper part of the subsoil does not have gray

Figure 13.—Areas of Sawabash silty clay loam, frequently flooded, undrained, are generally not suitable for crops or pasture.

mottles. In other areas the substratum is stratified sands and loams. A few places have slopes of more than 2 percent.

Included with this soil in mapping are small areas of Ormas, Brems, and Gilford soils. The well drained Ormas and moderately well drained Brems soils are slightly higher on the landscape than the Seafield soil. The very poorly drained Gilford soils are in the lower lying areas. Included soils make up about 4 percent of the map unit.

The available water capacity is moderate in the Seafield soil. Permeability is moderately rapid in the solum and rapid in the substratum. The content of organic matter in the surface layer is moderate. Runoff is slow. The seasonal high water table is at a depth of 1 to 2 feet from winter through early spring.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness and soil blowing are the main management concerns. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring. The wetness can be reduced by controlling the water table with open ditches, surface drains, and subsurface drains. Using a finely meshed filter to cover drainage tile helps to

prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to the ridge-till cropping system.

This soil is well suited to grasses and legumes, such as orchardgrass and ladino clover, for hay and pasture. Soil blowing is a major management concern. Excess water and frost heaving are also concerns. The excess water can be removed by surface drains, subsurface drains, or a combination of these practices. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is fairly well suited to trees. Plant competition is moderate. Seedlings survive and grow well if competing vegetation is controlled. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of wetness, this soil is severely limited as a site for dwellings. Adequate surface and subsurface drainage helps to overcome the wetness. Surface drains, foundation drains, and landscaping that removes runoff help to lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness.

Because of the potential for frost action, this soil is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action.

Because of the wetness and poor filtering qualities, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the poor filtering capacity and the wetness.

The land capability classification is IIw. The woodland ordination symbol is 3A.

Sf—Selma fine sandy loam. This very deep, nearly level, poorly drained soil is in broad depressions. It is frequently ponded for brief periods by surface runoff from surrounding areas. Individual areas are irregularly shaped and range from 10 to more than 500 acres in size. The dominant size is about 60 acres.

Typically, the surface soil is black fine sandy loam about 14 inches thick. The subsoil is dark grayish brown, grayish brown, and brown, mottled, friable loam about 22 inches thick. The substratum to a depth of about 60 inches is yellowish brown and brown, mottled loam that has strata of silt loam and very fine sand. In places the upper part of the solum contains more sand. In a few areas the subsoil contains more clay. In a few places the substratum is not stratified and is firm silt loam.

Included with this soil in mapping are a few small areas of the somewhat poorly drained Darroch soils. These soils are slightly higher on the landscape than the Selma soil. Also included are small areas of the moderately well drained Barce and Foresman soils in the higher positions on the landscape. Included soils make up about 10 percent of the map unit.

The available water capacity is high in the Selma soil. Permeability is moderate in the solum and moderately rapid in the substratum. The content of organic matter in the surface layer is high. Runoff is very slow or ponded. The seasonal high water table is at or above the surface from late winter through spring.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness, ponding, and soil blowing are the main management concerns. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring, thus allowing the planting of longer season varieties of adapted crops. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Small

enclosed depressions can generally be drained with an open inlet pipe in conjunction with subsurface drainage. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. Pumping can be used in areas where a suitable outlet is not available. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to the ridge-till cropping system.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. The ponding and the hazard of soil blowing are management concerns. Frost heaving and excess water are also concerns. The excess water can be removed by surface drains, subsurface drains, pumping, or a combination of these practices. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Ponded areas hinder the use of equipment, and machinery bogs down in this soil when it is wet. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Water-tolerant species are best suited. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the ponding, this soil is generally unsuited to dwellings and sanitary facilities. Because of the ponding and the potential for frost action, it is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action and ponding. Providing coarse grained subgrade or base material also helps to prevent the damage caused by frost action.

The land capability classification is IIw. No woodland ordination symbol is assigned.

Sg—Selma silt loam. This very deep, nearly level, poorly drained soil is in broad depressions. It is frequently ponded for brief periods by surface runoff from surrounding areas. Individual areas are irregularly shaped and range from 10 to more than 3,000 acres in size. The dominant size is about 200 acres.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsurface layer also is very dark grayish brown silt loam. It is about 6 inches thick. The subsoil is about 30 inches thick. The upper part is dark grayish brown, mottled, friable loam; the next part is grayish brown, mottled, friable clay loam; and the lower part is light brownish gray, mottled, friable loam. The substratum to a depth of about 60 inches is light brownish gray, mottled silt loam that has strata of sandy loam and loamy sand. In a few places the substratum is not stratified and is firm silt loam. In some areas the lower part of the subsoil contains less clay. In a few places the subsoil contains more clay. In a few areas the lower part of the substratum is firm loam till.

Included with this soil in mapping are a few small areas of the somewhat poorly drained Darroch soils and the moderately well drained Barce and Foresman soils. These soils are higher on the landscape than the Selma soil. They make up about 10 percent of the map unit.

The available water capacity is high in the Selma soil. Permeability is moderate in the solum and moderately rapid in the underlying material. The content of organic matter in the surface layer is high. Runoff is very slow or ponded. The seasonal high water table is at or above the surface from late winter through spring.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness and ponding are the main management concerns. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring, thus allowing the planting of longer season varieties of adapted crops. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Small enclosed depressions can generally be drained with an open inlet pipe in conjunction with subsurface drainage. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Pumping can be used in areas where a suitable outlet is not available. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter.

This soil is well suited to fall plowing, fall chisel, and ridge-till cropping systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. The ponding, frost heaving, and excess water are management concerns. Overgrazing and grazing during wet periods are also major concerns. Water management practices, such as drainage, are necessary for high yields of hay and pasture. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Water-tolerant species are best suited to this soil. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the ponding, this soil is generally unsuitable as a site for dwellings and sanitary facilities. Because of the ponding and the potential for frost action, it is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action and ponding. Providing coarse grained subgrade or base material also helps to prevent the damage caused by frost action.

The land capability classification is IIw. No woodland ordination symbol is assigned.

Sh—Selma loam, sandy substratum. This very deep, nearly level, poorly drained soil is in broad depressions. It is frequently ponded for brief periods by surface runoff from surrounding soils. Individual areas are broad and irregularly shaped and range from 10 to more than 3,000 acres in size. The dominant size is about 80 acres.

Typically, the surface layer is black loam about 10 inches thick. The subsurface layer is very dark brown, mottled loam about 7 inches thick. The subsoil is about 25 inches thick. The upper part is dark grayish brown and grayish brown, mottled, firm clay loam, and the lower part is brown, mottled, very friable loam. The substratum extends to a depth of about 60 inches. The upper part is brown, mottled loamy coarse sand, and the lower part is yellowish brown sand that has strata of fine sandy loam, very fine sand, and loamy coarse sand. In some areas the lower part of the subsoil contains less clay. In other areas the solum contains more sand. In a few areas the subsoil contains more clay. In places the lower part of the substratum is firm loam till.

Included with this soil in mapping are a few small areas of the somewhat poorly drained Darroch soils that have a sandy substratum and the moderately well drained Barce and Foresman soils. These soils are higher on the landscape than the Selma soil. They make up about 11 percent of the map unit.

The available water capacity is moderate in the Selma soil. Permeability is moderate in the solum and rapid in the substratum. The content of organic matter in the surface layer is high. Runoff is very slow or ponded. The seasonal high water table is at or above the surface from late fall through spring.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness and ponding are the main management concerns. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Small enclosed depressions can generally be drained with an open inlet pipe in conjunction with subsurface drainage. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. Pumping can be used in areas where a suitable outlet is not available. Cover crops, green manure crops, and crop residue management help to maintain tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to fall plowing, fall chisel, and ridge-till cropping systems.

This soil is well suited to grasses and legumes, such as canarygrass and ladino clover, for hay and pasture. The ponding, frost heaving, and excess water are management concerns. Overgrazing and grazing during wet periods are also major concerns. Water management practices, such as drainage, are necessary for high yields of hay and pasture. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Water-tolerant species are best suited to this soil. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the ponding, this soil is generally

unsuited to dwellings and sanitary facilities. Because of the ponding and the potential for frost action, it is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action and ponding. Providing coarse grained subgrade or base material also helps to prevent the damage caused by frost action.

The land capability classification is IIw. No woodland ordination symbol is assigned.

Sk—Selma silty clay loam, till substratum. This very deep, nearly level, poorly drained soil is in broad depressions. It is frequently ponded for brief periods by surface runoff from surrounding soils. Individual areas are broad and irregularly shaped and range from 10 to more than 3,000 acres in size. The dominant size is about 500 acres.

Typically, the surface soil is black silty clay loam about 16 inches thick. The subsoil is dark gray and gray, mottled, firm clay loam about 32 inches thick. The substratum extends to a depth of about 60 inches. The upper part is pale brown, mottled sandy loam that has strata of loamy sand, and the lower part is light olive brown, mottled loam. In places the soil contains more clay throughout. In some areas the lower part of the subsoil contains less clay. In other areas depth to the firm loam till is more than 60 inches.

Included with this soil in mapping are a few small areas of the somewhat poorly drained Darroch soils that have a till substratum, the moderately well drained Barce soils, and the moderately well drained Foresman soils that have a till substratum. These soils are higher on the landscape than the Selma soil. They make up about 10 percent of the map unit.

The available water capacity is high in the Selma soil. Permeability is moderate in the solum and the upper part of the substratum and is moderately slow or slow in the lower part of the substratum. The content of organic matter in the surface layer is high. Runoff is very slow or ponded. The seasonal high water table is at or above the surface from winter through spring.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness and ponding are the main management concerns. The surface layer is firm. If it is tilled when wet, large clods form. The clods become hard when they dry, and the cloddiness makes preparing a seedbed difficult. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. Pumping can be used in areas where a suitable outlet is not available. Cover crops, green manure crops, and crop residue management help to maintain tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to fall plowing, fall chisel, and ridge-till cropping systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. The ponding, frost heaving, and excess water are management concerns. Overgrazing and grazing during wet periods are also major concerns. Water management practices, such as drainage, are necessary for high yields of hay and pasture. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Water-tolerant species are best suited to this soil. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the ponding, this soil is generally unsuited to dwellings and sanitary facilities. Because of the ponding and the potential for frost action, it is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action and ponding. Providing coarse grained subgrade or base material also helps to prevent the damage caused by frost action.

The land capability classification is IIw. No woodland ordination symbol is assigned.

SmB—Simonin loamy sand, 1 to 3 percent slopes. This very deep, nearly level, moderately well drained soil is on slightly convex rises. Individual areas are elongated and irregularly shaped and range from 3 to 60 acres in size. The dominant size is about 15 acres.

Typically, the surface layer is very dark grayish brown loamy sand about 10 inches thick. The subsoil is about 29 inches thick. The upper part is yellowish

brown, very friable sand; the next part is yellowish brown, mottled, friable sandy loam; and the lower part is yellowish brown, mottled, firm silty clay. The substratum to a depth of about 60 inches is yellowish brown, mottled silty clay. In some areas the lower part of the solum contains less clay. In a few places the lower part of the solum and the substratum contain more sand. In some areas the surface layer is light colored or is thinner. In other areas the sandy layers are less than 20 inches thick.

Included with this soil in mapping are small areas of Iroquois, Montgomery, Papineau, and Wesley soils. The very poorly drained Iroquois and Montgomery soils are in the lower positions on the landscape. The somewhat poorly drained Papineau and Wesley soils are slightly lower on the landscape than the Simonin soil. Included soils make up about 10 percent of the map unit.

The available water capacity is moderate in the Simonin soil. Permeability is rapid in the upper part of the solum, moderately rapid in the middle part, and slow in the lower part of the solum and in the substratum. The content of organic matter in the surface layer is moderately low. Runoff is slow. The seasonal high water table is at a depth of 2.5 to 4.0 feet from late fall through spring.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Droughtiness and soil blowing are the main management concerns. Irrigation systems reduce seasonal crop stress and increase yields. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Cover crops, green manure crops, and crop residue management help to maintain the content of organic matter. In areas where hillside seepage occurs, subsurface drains should be installed. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. This soil is well suited to ridge-till and no-till cropping systems.

This soil is well suited to grasses and legumes, such as orchardgrass and ladino clover, for hay and pasture. Soil blowing, droughtiness, excess water, and frost heaving are management concerns. The excess water can be removed by surface drains, subsurface drains, or a combination of these practices. Irrigation can be used to reduce droughtiness. Overgrazing and grazing during wet periods are also major management concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted legumes. Proper stocking rates, timely deferment of grazing, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is suitable for dwellings without basements. It is severely limited as a site for dwellings with basements because of the shrink-swell potential. The construction of foundations, footings, or basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete.

Because of the potential for frost action, this soil is moderately limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action.

Because of the wetness, the restricted permeability, and poor filtering qualities, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the restricted permeability and the wetness.

The land capability classification is IIs. No woodland ordination symbol is assigned.

SrB—Sparta loamy fine sand, 1 to 4 percent slopes. This very deep, nearly level or gently sloping, excessively drained soil is on convex ridges. Individual areas are irregularly shaped and range from 5 to 35 acres in size. The dominant size is about 15 acres.

Typically, the surface layer is very dark grayish brown loamy fine sand about 9 inches thick. The subsurface layer is dark brown fine sand about 5 inches thick. The subsoil is yellowish brown, very friable fine sand about 17 inches thick. The substratum to a depth of about 10 inches is yellowish brown fine sand. In places the lower part of the subsoil and the substratum contain more clay. In a few areas the surface soil is thinner. In some places, textural bands of loamy fine sand are in the lower part of the subsoil or gray mottles

are in the substratum. In a few places the substratum is loam till. A few small areas have slopes of less than 1 percent or more than 4 percent.

Included with this soil in mapping are a few small areas of the somewhat poorly drained Watseka soils and the moderately well drained Nesius soils. These soils are in the lower positions on the landscape. Also included are the well drained Ayr soils. Ayr soils are in landscape positions similar to those of the Sparta soil. Included soils make up about 10 percent of the map unit.

The available water capacity is low in the Sparta soil. Permeability is rapid. The content of organic matter in the surface layer is moderately low. Runoff is slow.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

This soil is poorly suited to corn, soybeans, and small grain. Droughtiness and soil blowing are the main management concerns. Irrigation systems can reduce seasonal crop stress and increase crop yields. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Crop residue management, cover crops, and green manure crops help to maintain or improve tilth and the content of organic matter. This soil is well suited to the no-till cropping system.

This soil is well suited to grasses and legumes, such as bromegrass and alfalfa, for pasture. It is fairly well suited to hay. Soil blowing and droughtiness are hazards. Overgrazing and grazing during wet periods are also major management concerns. Overgrazing increases the hazard of soil blowing and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, causes excessive runoff, reduces forage yields, damages the sod, and reduces plant density and hardiness. Irrigation can reduce droughtiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Deep-rooted legumes and drought-tolerant species are best suited to this soil. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control soil blowing, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is well suited to trees. Seedling mortality is the main management concern. Planting more trees than is necessary helps to overcome seedling mortality, but thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock or planting larger stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Pines, which have a deep taproot system, generally grow well on this soil. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

This soil is suitable as a site for dwellings and local roads and streets. Because of poor filtering qualities, it is severely limited as a site for septic tank absorption fields. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the poor filtering capacity.

The land capability classification is IVs. The woodland ordination symbol is 4S.

SwA—Strole silty clay loam, 0 to 1 percent slopes. This very deep, nearly level, somewhat poorly drained soil is on slightly convex rises. Individual areas are irregularly shaped and range from 5 to 200 acres in size. The dominant size is about 80 acres.

Typically, the surface layer is very dark gray silty clay loam about 6 inches thick. The subsurface layer is very dark grayish brown silty clay loam about 6 inches thick. The subsoil is yellowish brown and brown, mottled, firm silty clay about 18 inches thick. The substratum to a depth of about 60 inches is brown, mottled silty clay. In some areas the upper part of the solum contains less clay. In places the dark colored surface soil is thinner. In a few areas the surface soil contains more sand and silt. In some places the subsoil is silty clay loam.

Included with this soil in mapping are a few small areas of the very poorly drained Iroquois and Montgomery soils. These soils are in the lower positions on the landscape. They make up about 10 percent of the map unit.

The available water capacity is moderate in the Strole soil. Permeability is slow. The content of organic matter in the surface layer is moderate. Runoff is slow. The seasonal high water table is at a depth of 1 to 2 feet from late fall through spring.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness is the main management concern. The surface layer is firm. If it is tilled when wet, large clods may form. The clods become hard when they dry. The cloddiness makes preparing a seedbed difficult. A drainage system helps to lower the water table and

raises the temperature of the soil more quickly in the spring, thus allowing the planting of longer season varieties of adapted crops. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Because of the clayey subsoil, the tiles in subsurface drainage systems should be closely spaced. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to the fall chisel cropping system.

This soil is well suited to grasses and legumes, such as orchardgrass and ladino clover, for hay and pasture. Excess water and frost heaving are limitations. The excess water can be removed by surface drains, subsurface drains, or a combination of these practices. Overgrazing and grazing during wet periods are major management concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the wetness and the shrink-swell potential, this soil is severely limited as a site for dwellings. Adequate surface and subsurface drainage helps to overcome the wetness. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness. The construction of foundations, footings, or basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete.

Because of low strength, the shrink-swell potential, and the wetness, this soil is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to overcome the wetness.

Because of the wetness and the restricted permeability, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the high water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the restricted permeability.

The land capability classification is IIw. No woodland ordination symbol is assigned.

SxA—Sumava-Ridgeville-Odell complex, 0 to 2 percent slopes. This map unit consists of very deep, nearly level, somewhat poorly drained soils on slight ridges and knolls. The Sumava soil is typically on side slopes. The Ridgeville soil is on toe slopes. The Odell soil is on summits. Individual areas of these soils are typically irregularly shaped and range from 5 to 70 acres in size. The dominant size is about 30 acres. The areas are about 45 percent Sumava soil, 25 percent Ridgeville soil, and 20 percent Odell soil. The three soils occur as areas so intricately mixed or so small that it is not practical to separate them in mapping.

Typically, the surface layer of the Sumava soil is very dark gray fine sandy loam about 10 inches thick. The subsoil is about 29 inches thick. It is light olive brown and yellowish brown, mottled, friable fine sandy loam in the upper part; pale brown, mottled, very friable fine sandy loam in the next part; and yellowish brown, mottled friable loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, mottled loam. In places the surface layer contains more sand. In some areas the solum contains more clay.

Typically, the surface soil of the Ridgeville soil is very dark grayish brown fine sandy loam about 12 inches thick. The subsoil is dark brown and grayish brown, mottled, very friable fine sandy loam about 29 inches thick. The substratum to a depth of about 60 inches is light brownish gray, mottled fine sand that has strata of sandy loam. In places the solum contains more sand. In a few areas the solum contains more clay.

Typically, the surface layer of the Odell soil is black loam about 10 inches thick. The subsoil is about 20 inches thick. It is dark yellowish brown and yellowish brown, mottled, firm clay loam in the upper part and pale brown, mottled, firm loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown and brown, mottled loam. In places the surface layer contains more sand. In some areas the lower part of the profile is stratified sands and loams. In other areas the solum is more than 40 inches thick.

Included with these soils in mapping are small areas of the very poorly drained Barry and Gilford soils in the lowest areas; the moderately well drained Ayrmount, Corwin, Montmorenci, and Onarga soils in the slightly higher areas; and the well drained Ayr and Octagon soils in the higher positions. Included soils make up about 20 percent of the map unit.

The available water capacity is moderate in the

Sumava, Ridgeville, and Odell soils. Permeability is moderately rapid in the upper part of the solum of the Sumava soil and moderate in the lower part of the solum and in the substratum. It is moderately rapid in the Ridgeville soil. It is moderate in the solum of the Odell soil and moderately slow in the substratum. The content of organic matter in the surface layer of all three soils is moderate. Surface runoff is slow. The seasonal high water table is at a depth of 1 to 3 feet from winter through spring.

Most areas are used for cultivated crops. Some areas are used for hay, pasture, or woodland.

These soils are well suited to corn, soybeans, and small grain. Wetness and soil blowing are the main management concerns. A drainage system helps to lower the water table and raises the temperature of the soils more quickly in the spring, thus allowing the planting of longer season varieties of adapted crops. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. Excessive drainage by subsurface drainage systems may cause droughtiness. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Crop residue management, cover crops, and green manure crops help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. These soils are well suited to no-till and ridge-till cropping systems.

These soils are well suited to grasses and legumes, such as orchardgrass and ladino clover, for hay and pasture. Soil blowing, excess water, and frost heaving are management concerns. The excess water can be removed by surface drains, subsurface drains, or a combination of these practices. Irrigation can reduce droughtiness. Overgrazing and grazing during wet periods are also major concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the wetness, these soils are severely limited as sites for dwellings. Surface drains, foundations drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness.

Because of the potential for frost action, the Sumava soil is moderately limited as a site for local roads and streets and the Ridgeville and Odell soils are severely limited. The wetness is an additional limitation in areas of the Sumava soil. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action and by wetness. Providing coarse grained subgrade or base material also helps to prevent the damage caused by frost action.

Because of the wetness, these soils are severely limited as sites for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness.

The land capability classification is IIw for the Sumava and Odell soils and IIs for the Ridgeville soil. No woodland ordination symbol is assigned.

SyA—Swygert silt loam, 0 to 2 percent slopes. This very deep, nearly level, somewhat poorly drained soil is on slightly convex rises. Individual areas are irregularly shaped and range from 3 to 80 acres in size. The dominant size is about 25 acres.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsurface layer is very dark grayish brown silty clay loam about 4 inches thick. The subsoil is about 30 inches thick. The upper part is dark brown and brown, mottled, firm silty clay, and the lower part is olive gray and light olive gray, mottled, very firm silty clay. The substratum to a depth of about 60 inches is gray, mottled silty clay. In places the upper part of the solum contains less clay. In some areas the dark surface soil is thinner. Other areas have slopes of more than 2 percent. In some small areas the depth to the substratum is less than 35 inches.

Included with this soil in mapping are small areas of Bryce and Simonin soils. The very poorly drained Bryce soils are in the lowest positions on the landscape. The moderately well drained Simonin soils are higher on the landscape than the Swygert soil. Included soils make up

about 10 percent of the map unit.

The available water capacity is moderate in the Swygert soil. Permeability is moderate and moderately slow in the upper part of the solum, slow in the lower part of the solum, and very slow in the substratum. The content of organic matter in the surface layer is moderate. Runoff is slow. The seasonal high water table is at a depth of 2 to 4 feet from late winter through spring.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness is the main management concern. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring, thus allowing the planting of longer season varieties of adapted crops. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Because of the clayey subsoil, subsurface drainage tiles should be closely spaced. Cover crops, green manure crops, and crop residue management help to maintain tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to the fall chisel cropping system.

This soil is well suited to grasses and legumes, such as orchardgrass and ladino clover, for hay and pasture. Excess water and frost heaving are limitations. The excess water can be removed by surface drains, subsurface drains, or a combination of these practices. Overgrazing and grazing during wet periods are also major management concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the wetness and the shrink-swell potential, this soil is severely limited as a site for dwellings. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness. The construction of foundations, footings, or basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete.

Because of low strength, the shrink-swell potential, and the potential for frost action, this soil is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength, shrinking and swelling of the soil, and frost action.

Because of the wetness and the restricted permeability, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with a suitable fill material improves the capacity of the absorption field and helps to overcome the wetness and the restricted permeability.

The land capability classification is IIw. No woodland ordination symbol is assigned.

SzB2—Swygert Variant-Simonin complex, 2 to 6 percent slopes, eroded. This map unit consists of very deep, moderately well drained soils on convex ridges or knolls. The Swygert Variant soil is typically on summits and the upper side slopes. The Simonin soil is typically on the lower lying side slopes and foot slopes on the leeward side of the mapped areas. Individual areas of this unit are irregularly shaped and range from 5 to 200 acres in size. The dominant size is about 35 acres. The areas are about 50 percent Swygert Variant soil and 40 percent Simonin soil. The two soils occur as areas so intricately mixed or so small that it is not practical to separate them in mapping.

Typically, the surface layer of the Swygert Variant soil is very dark grayish brown loam mixed with yellowish brown silty clay loam from the subsoil. It is about 8 inches thick. The subsoil is about 31 inches thick. The upper part is yellowish brown, firm silty clay loam, and the lower part is yellowish brown, mottled, firm and very firm silty clay. The substratum to a depth of about 60 inches is light olive brown, mottled silty clay. In a few places the surface layer is lighter colored. Some areas have slopes of less than 2 percent or more than 6 percent.

Typically, the surface layer of the Simonin soil is very dark grayish brown loamy fine sand mixed with dark brown loamy fine sand from the subsoil. It is about 10 inches thick. The subsoil is about 29 inches thick. It is dark brown, very friable loamy fine sand in the upper part; dark yellowish brown, friable fine sandy loam in the next part; and olive brown, mottled, very firm clay in the lower part. The substratum to a depth of about 60

inches is light yellowish brown, mottled clay. In some places the combined thickness of the sandy upper layers is less than 20 inches. In some areas the dark surface layer is thinner. In a few places the surface layer is fine sandy loam. A few areas have slopes of less than 2 percent or more than 6 percent.

Included with these soils in mapping are small areas of the very poorly drained Bryce soils in the lower positions on the landscape. Also included are areas of the somewhat poorly drained Papineau and Swygert soils in the slightly lower lying areas and a few areas of moderately well drained, severely eroded soils on the steeper slopes. Included soils make up about 10 percent of the map unit.

The available water capacity is moderate in the Swygert Variant soil and low in the Simonin soil. Permeability is moderately slow in the upper part of the solum in the Swygert Variant soil and slow in the lower part of the solum and in the substratum. It is rapid in the upper part of the solum in the Simonin soil, moderately rapid in the middle part, and slow in the lower part of the solum and in the substratum. The content of organic matter in the surface layer of both soils is moderately low. Surface runoff is medium on the Swygert Variant soil and slow on the Simonin soil. The Swygert Variant soil has a seasonal high water table at a depth of 2.0 to 3.5 feet from late fall through spring. The Simonin soil has a seasonal high water table at a depth of 2.5 to 4.0 feet from late fall through spring.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

These soils are fairly well suited to corn, soybeans, and small grain. Erosion is the main management concern. Erosion and surface runoff can be controlled by crop rotation, critical-area plantings, terraces, diversions, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and conservation tillage systems that leave all or part of the crop residue on the surface. Grassed waterways help to control erosion in drainageways. In areas where hillside seepage occurs, subsurface drains should be installed. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments in areas of the Simonin soil. Droughtiness and soil blowing are additional management concerns in areas of the Simonin soil. Soil moisture can be conserved by using conservation practices, such as critical-area plantings, cover crops, green manure crops, crop residue management, and waste management systems. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Cover crops, green manure crops, and crop residue management help to maintain tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter.

These soils are well suited to grasses and legumes, such as bromegrass and alfalfa, for hay and pasture. Controlling runoff and erosion is a major management concern. Soil blowing and droughtiness are additional concerns in areas of the Simonin soil. Overgrazing and grazing during wet periods are also major management concerns. Overgrazing increases the hazard of soil blowing and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, causes excessive runoff, reduces forage yields, damages the sod, and reduces plant density and hardiness. Irrigation can reduce droughtiness in areas of the Simonin soil. Maintaining a permanent cover of grasses and legumes slows runoff and helps to control erosion and soil blowing. Deep-rooted legumes and drought-tolerant species are best suited to these soils. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control soil blowing and erosion, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the shrink-swell potential, the Swygert Variant soil is severely limited as a site for dwellings without basements. The Simonin soil is suitable as a site for dwellings without basements. Because of the shrink-swell potential and the wetness, these soils are severely limited as sites for dwellings with basements. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness. The construction of foundations, footings, or basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete.

Because of low strength and the shrink-swell potential, the Swygert Variant soil is severely limited as a site for local roads and streets. The Simonin soil is moderately limited as a site for local roads and streets because of the potential for frost action. The upper layer of the soil should be replaced or strengthened with a more suitable base material. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength, shrinking and swelling,

and frost action. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action.

Because of wetness and the restricted permeability, these soils are severely limited as sites for septic tank absorption fields. A poor filtering capacity is an additional limitation in areas of the Simonin soil. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness, the poor filtering capacity, and the restricted permeability.

The land capability classification is IIIe. No woodland ordination symbol is assigned.

SzC2—Swygert Variant-Simonin complex, 6 to 15 percent slopes, eroded. This map unit consists of very deep, moderately sloping or strongly sloping, moderately well drained soils on convex ridges or knolls. The Swygert Variant soil is typically on summits and the upper side slopes. The Simonin soil is typically on the lower lying side slopes and foot slopes on the leeward side of the mapped areas. Individual areas of this unit are irregularly shaped and range from 5 to 80 acres in size. The dominant size is about 30 acres. The areas are about 60 percent Swygert Variant soil and 30 percent Simonin soil. The two soils occur as areas so intricately mixed or so small that it is not practical to separate them in mapping.

Typically, the surface layer of the Swygert Variant soil is very dark grayish brown loam mixed with dark yellowish brown silty clay from the subsoil. It is about 7 inches thick. The subsoil is about 29 inches thick. The upper part is dark yellowish brown, firm silty clay; the next part is yellowish brown, mottled, firm silty clay; and the lower part is yellowish brown, mottled, very firm silty clay. The substratum to a depth of about 60 inches is light olive brown silty clay. In places the surface layer is light colored. Some areas have slopes of less than 5 percent or more than 15 percent. A few areas are more eroded.

Typically, the surface layer of the Simonin soil is very dark grayish brown loamy fine sand mixed with dark brown loamy fine sand from the subsoil. It is about 10 inches thick. The subsoil is about 24 inches thick. It is dark brown, very friable loamy fine sand in the upper part; yellowish brown, friable fine sandy loam in the next part; and yellowish brown, mottled, firm clay in the lower part. The substratum to a depth of about 60 inches is light yellowish brown clay. In some places the combined thickness of the sandy upper layers is less than 20 inches. In some areas the dark surface layer is thinner. In a few places the surface layer is fine sandy loam. A few areas have slopes of less than 6 percent or more than 15 percent.

Included with these soils in mapping are small areas of the very poorly drained Bryce soils in the lower positions on the landscape, the somewhat poorly drained Papineau and Swygert soils in the slightly lower lying areas, and a few areas of moderately well drained, severely eroded soils on the steeper slopes. Included soils make up about 15 percent of the map unit.

The available water capacity is moderate in the Swygert Variant soil and low in the Simonin soil. Permeability is moderately slow in the upper part of the solum in the Swygert Variant soil and slow in the lower part of the solum and in the substratum. It is rapid in the upper part of the solum in the Simonin soil, moderately rapid in the middle part, and slow in the lower part of the solum and in the substratum. The content of organic matter in the surface layer of both soils is moderately low. Surface runoff is medium. The Swygert Variant soil has a seasonal high water table at a depth of 2.0 to 3.5 feet from late fall through spring. The Simonin soil has a seasonal high water table at a depth of 2.5 to 4.0 feet from late fall through spring.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

These soils are poorly suited to corn, soybeans, and small grain. Erosion is the main management concern. Erosion and surface runoff can be controlled by crop rotation, critical-area plantings, terraces, diversions, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and conservation tillage systems that leave all or part of the crop residue on the surface. Grassed waterways help to control erosion in drainageways. In areas where hillside seepage occurs, subsurface drains should be installed. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments in areas of the Simonin soil. Droughtiness and soil blowing are additional management concerns in areas of the Simonin soil. Soil moisture can be conserved by using conservation practices, such as critical-area plantings, cover crops, and green manure crops. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation.

These soils are well suited to grasses and legumes, such as bromegrass and alfalfa, for pasture. They are fairly well suited to hay. Controlling erosion and runoff is a major management concern. Soil blowing and

droughtiness are additional concerns in areas of the Simonin soil. Overgrazing and grazing during wet periods are also major concerns. Overgrazing increases the hazard of soil blowing and reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, causes excessive runoff, reduces forage yields, damages the sod, and reduces plant density and hardiness. Irrigation can reduce droughtiness in areas of the Simonin soil. Maintaining a permanent cover of grasses and legumes slows runoff and helps to control erosion and soil blowing. Deep-rooted legumes and drought-tolerant species are best suited to these soils. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to control soil blowing and erosion, minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the shrink-swell potential, these soils are severely limited as sites for dwellings with basements. The wetness is an additional limitation in areas of the Swygert Variant soil. Because of the shrink-swell potential, the Swygert Variant soil is severely limited as a site for dwellings without basements. The slope is a moderate limitation affecting dwellings without basements in areas of the Simonin soil. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness. The construction of foundations, footings, or basement walls should include using adequate reinforcement steel in concrete foundations, excavating layers that have a high shrink-swell potential, backfilling with sand or gravel, placing structures on reinforced concrete slabs, and including expansion joints in all concrete. Dwellings should be designed so that they conform to the natural slope of the land. Land shaping may be necessary in some areas. Installing retaining walls and placing diversions between lots also help to overcome the slope.

Because of low strength and the shrink-swell potential, the Swygert Variant soil is severely limited as a site for local roads and streets. The potential for frost action and the slope are moderate limitations in areas of the Simonin soil. The upper layer of the soil should be replaced or strengthened with a more suitable base material. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength, shrinking and swelling, and frost action. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action. Land shaping and constructing roads on the contour help to overcome the slope.

Because of the wetness and the restricted permeability, these soils are severely limited as sites for septic tank absorption fields. A poor filtering capacity is an additional limitation in areas of the Simonin soil. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness, the poor filtering capacity, and the restricted permeability.

The land capability classification is IVe. No woodland ordination symbol is assigned.

TaA—Tedrow loamy fine sand, 0 to 2 percent slopes. This very deep, nearly level, somewhat poorly drained soil is on slightly convex rises. Individual areas are elongated or oval. They range from 15 to 300 acres in size. The dominant size is about 80 acres.

Typically, the surface layer is very dark grayish brown loamy fine sand about 9 inches thick. The subsoil is very friable sand about 20 inches thick. The upper part is dark brown, and the lower part is pale brown and is mottled. The substratum to a depth of about 60 inches is light brownish gray, mottled sand. In some areas the soil has a buried surface layer. In places the soil is more acid. In a few areas the soil has an irregular decrease in organic carbon.

Included with this soil in mapping are a few small areas of the very poorly drained Conrad and Kentland soils. These soils are in the lower positions on the landscape. They make up about 10 percent of the map unit.

The available water capacity is low in the Tedrow soil. Permeability is rapid. The content of organic matter in the surface layer is moderately low. Runoff is slow. The seasonal high water table is at a depth of 1 to 2 feet in winter and early spring.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

This soil is fairly well suited to corn, soybeans, and small grain. Droughtiness, soil blowing, and wetness are the main management concerns. Irrigation systems can reduce seasonal crop stress and increase crop yields. Droughtiness can be minimized by controlling the water table with subsurface irrigation. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. The wetness can be reduced by controlling the water table with open ditches, surface drains, and

subsurface drains. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. Excessive drainage by the subsurface drainage system may cause droughtiness. This soil is well suited to the ridge-till cropping system.

This soil is well suited to grasses and legumes, such as orchardgrass and ladino clover, for hay and pasture. Soil blowing, droughtiness, excess water, and frost heaving are management concerns. The excess water can be removed by surface drains, subsurface drains, or a combination of these practices. Irrigation can reduce droughtiness. Overgrazing and grazing during wet periods are also major concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is well suited to trees. The main management concerns are equipment limitations, seedling mortality, and plant competition. Because the soil is sandy, equipment tends to bog down during very dry periods. Planting more trees than is necessary helps to overcome seedling mortality, but thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock or planting larger stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Pines, which have a deep taproot system, generally grow well on this soil. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the wetness, this soil is severely limited as a site for dwellings. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness.

Because of the wetness and the potential for frost action, this soil is moderately limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action and by wetness. Providing coarse grained subgrade or base material also helps to prevent the damage caused by frost action.

Because of the wetness and poor filtering qualities, this soil is severely limited as a site for septic tank absorption fields. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the poor filtering capacity. Installing perimeter drains around the filter field helps to lower the water table.

The land capability classification is IIIs. The woodland ordination symbol is 4S.

To—Toto muck, drained. This very deep, nearly level, very poorly drained soil is in depressional areas. It is frequently ponded for brief periods by surface runoff from surrounding soils. Individual areas are irregularly shaped and range from 20 to 60 acres in size. The dominant size is about 40 acres.

Typically, the surface tier is black muck about 10 inches thick. The subsurface tiers are very dark gray and dark brown muck about 14 inches thick. The substratum extends to a depth of about 60 inches. It is pale brown, mottled marl in the upper part; dark gray, mottled coprogenous earth in the next part; and grayish brown, mottled sand in the lower part. In places the coprogenous earth extends below a depth of 60 inches. In a few areas the muck is 16 to 50 inches thick over sand. In other areas the muck is more than 51 inches thick. In places the substratum is loamy material.

Included with this soil in mapping are a few small areas of the very poorly drained Martisco Variant soils. These soils are in the slightly higher positions on the landscape. They formed in marl and coprogenous earth over sandy deposits. They make up about 2 percent of the map unit.

The available water capacity is very high in the Toto soil. Permeability is moderately slow to moderately rapid in the organic material, slow in the coprogenous earth, and rapid in the sandy substratum. The content of organic matter in the surface layer is very high. Runoff is very slow or ponded. The seasonal high water table is at or above the surface from fall through spring.

Most areas are used for cultivated crops.

This soil is poorly suited to corn and soybeans. Wetness, ponding, and soil blowing are the main management concerns (fig. 14). A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring. The

Figure 14.—Soil blowing in an area of Toto muck, drained.

wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Ponded areas can generally be drained with an open inlet pipe in conjunction with subsurface drainage. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Pumping can be used in areas where a suitable outlet is not available. Excessive drainage by the subsurface drainage system may cause droughtiness. Droughtiness can be minimized by controlling the water table with subsurface irrigation. Drainage systems should be designed so that they keep the water table at the level required by crops during the growing season and raise the water table to the surface during the rest of the year. Such systems minimize oxidation and subsidence of the organic materials and reduce the hazard of soil blowing. Because the soil is unstable, caution is advised if heavy equipment is used near open ditches. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these

practices; or by maintaining a permanent cover of vegetation. This soil is well suited to the spring plow cropping system.

This soil is fairly well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay. It is well suited to pasture. Soil blowing, ponding, frost heaving, excess water, and subsiding of the muck after drainage are management concerns. Overgrazing and grazing when the soil is too wet are additional concerns. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. The muck may be unstable. Ponded areas hinder the use of equipment, and machinery bogs down in this soil when it is wet. Management of the water table determines the rate at which the muck oxidizes. Overdrainage increases the rate of oxidation. If drainage outlets are available, the excess water can be removed by surface drains, subsurface drains, pumping, or a combination of these practices. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Drainage helps to control the stability of the muck. Overgrazing reduces plant density and hardiness. Grazing during wet periods reduces forage yields, damages the sod, and reduces plant density and hardiness. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted legumes. Proper stocking rates, timely deferment of grazing, and restricted use during wet periods help to maintain good plant density and hardiness and keep the pasture in good condition.

This soil is poorly suited to trees. The main management concerns are equipment limitations, seedling mortality, the windthrow hazard, and plant competition. The equipment limitations can be overcome by delaying timber harvest until dry periods or until the soil is frozen. Planting more trees than is necessary helps to overcome seedling mortality, but thinning may be required later. Seedling mortality can also be reduced by using containerized stock or planting larger stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Selecting water-tolerant species helps to overcome the windthrow hazard. Harvest methods that do not leave the remaining trees isolated or widely spaced should be used. Care should be taken to avoid damaging the surficial root systems of unharvested trees. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by cutting, spraying, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the ponding, this soil is generally unsuited to dwellings and septic tank absorption fields. Because of the ponding and the potential for frost action, it is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action and by ponding. Providing coarse grained subgrade or base material also helps to prevent the damage caused by frost action.

The land capability classification is IVw. The woodland ordination symbol is 2W.

Ud—Udorthents, loamy. This map unit consists of shallow to deep, nearly level to very steep, very poorly drained to well drained soils on lake plains, outwash plains, and moraines. These soils formed in spoil from gravel pits, landfills, sand pits, and limestone quarries. Individual areas are irregularly shaped and range from about 3 to 45 acres in size. The dominant size is about 10 acres.

Typically, the upper 3 to 4 feet consists of loam, clay loam, gravelly loam, or gravelly clay loam. The underlying material is loam, silt loam, or silty clay loam. In a few areas the till is exposed at the surface. In places the underlying material is sand and gravel.

Included in mapping are small areas of soils that are sandy throughout the profile and a few areas where limestone bedrock is exposed at the surface. Also included are areas where crushed stone is stockpiled and some small areas that are flooded during most of the year. Included areas make up about 30 percent of the map unit.

The available water capacity of the Udorthents ranges from moderate to very low. Permeability is typically moderate but can vary, depending on the type of soil material. The content of organic matter in the surface soil is low or moderate. Runoff is slow to rapid. The high water table is commonly at a depth of about 1 to 4 feet, but the depth to the water table can vary, depending on the texture of the soil material.

Most areas are used for stockpiling materials excavated from adjacent pits or quarries. Some areas are used as sanitary landfills. Some areas support vegetation, such as weeds and scrub brush. In a few areas, however, no vegetation grows on the existing material.

These soils are generally poorly suited to corn, soybeans, and small grain. Preparing a seedbed can be difficult because of the gravel and large stones. The slope limits or prevents the use of equipment in some areas. Because of the extreme variability of the soil material, special management practices are needed. An intensive fertilization program, with special emphasis on

incorporating organic residue or manure into the soil, is needed if these soils are to be used for crops. Conservation practices are needed to control erosion in the sloping areas. Erosion and surface runoff can be controlled by water- and sediment-control basins, diversions, crop rotations, critical-area plantings, cover crops, green manure crops, grade-stabilization structures, and conservation tillage systems that leave a protective cover of crop residue on the surface. Drainage may be needed in the nearly level areas. Cover crops, green manure crops, and crop residue management help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter.

These soils are fairly well suited to grasses and legumes, such as bromegrass and ladino clover, for hay. They are well suited to pasture. Droughtiness is the main limitation if grasses and legumes are established. Special management practices are needed. An intensive fertilization program, with special emphasis on incorporating organic residue or manure into the soil, is needed if these soils are to be used for forage crops. Cover crops should be planted in exposed areas as soon as possible. Overgrazing and grazing during wet periods are major management concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted legumes in the wetter areas. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

These soils are not used for dwellings, local roads and streets, or septic tank absorption fields. Onsite investigation is needed if urban development is planned.

The land capability classification is VIs. No woodland ordination symbol is assigned.

Wa—Wallkill loam, pothole. This very deep, nearly level, very poorly drained soil is in depressions. It is frequently ponded for very long periods by surface runoff from surrounding soils. Individual areas are elongated and irregularly shaped and range from 3 to 30 acres in size. The dominant size is about 5 acres.

Typically, the surface soil is very dark grayish brown loam about 31 inches thick. The substratum to a depth of about 60 inches is black and dark brown muck. In places the surface layer is thin and consists of organic material. A few areas are not underlain by organic deposits and have more clay in the solum. In a few places the mineral material is more than 40 inches thick.

Included with this soil in mapping are some small areas of the well drained Octagon soils in the higher positions on the landscape. Also included are a few areas of somewhat poorly drained soils near the edges of the mapped areas. These poorly drained soils have textures similar to those of the Wallkill soil.

The available water capacity is very high in the Wallkill soil. Permeability is moderate in the mineral material and moderately rapid or rapid in the organic material. The content of organic matter in the surface layer is high. Runoff is very slow or ponded. The seasonal high water table is at or above the surface from fall through spring.

Most areas are used for cultivated crops. A few areas are used as wetland wildlife habitat.

This soil is fairly well suited to corn and soybeans. Wetness and ponding are the major management concerns. Plant growth and development are frequently inhibited by excess water. The high water table disrupts normal root growth and commonly results in a shallow rooting system. Thus, some plants mature slowly and may be drowned out by ponding. If small grain is planted in the fall, it is subject to severe damage during periods of prolonged ponding. The use of machinery is often hindered because of the wetness. Machinery tends to bog down in areas of this soil. Drainage helps to lower the water table and raises the temperature of the soil more quickly in the spring. If an adequate outlet is available, the soil can be drained with an open inlet pipe in conjunction with subsurface drainage. A pumping system can be used in areas that do not have a suitable outlet. Because the soil is unstable, caution is advised if heavy equipment is used near open ditches. Conservation practices, such as conservation tillage that leave a protective cover of crop residue on the surface, cover crops, and green manure crops, help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to fall plowing, fall chisel, and ridge-till cropping systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Ponding, frost heaving, and excess water are management concerns. Overgrazing and grazing during wet periods are also major concerns. Water management practices, such as drainage, are necessary for high yields of hay and pasture. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and

hardiness. Water-tolerant species are best suited to this soil. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

This soil is poorly suited to trees. The main management concerns are equipment limitations, seedling mortality, the windthrow hazard, and plant competition. The equipment limitations can be overcome by delaying timber harvest until dry periods or until the soil is frozen. Planting more trees than is necessary helps to overcome seedling mortality, but thinning may be required later. Seedling mortality can also be reduced by using containerized stock or planting larger stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Harvest methods that do not leave the remaining trees isolated or widely spaced should be used. Care should be taken to avoid damaging the surficial root systems of unharvested trees. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the ponding, this soil is generally unsuited to dwellings and sanitary facilities. Because of the ponding and the potential for frost action, it is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action and by ponding. Removing the organic material and providing coarse grained subgrade or base material also help to prevent the damage caused by frost action.

The land capability classification is IIIw. The woodland ordination symbol is 3W.

Wc—Wallkill Variant mucky silty clay. This very deep, nearly level, very poorly drained soil is in depressional areas. It is frequently ponded for brief periods by surface runoff from adjacent soils. Individual areas are irregularly shaped. They range from 5 to more than 400 acres in size. The dominant size is about 200 acres.

Typically, the surface layer is black mucky silty clay about 10 inches thick. The subsurface layer is black silty clay about 14 inches thick. The subsoil is about 14 inches thick. It is gray, mottled, firm silty clay in the upper part and olive gray, firm mucky silty clay in the lower part. The substratum to a depth of about 60 inches is black muck. In places the subsoil contains less clay and more sand. In some areas the depth to muck is more than 40 inches. In other areas the underlying material has sand above a depth of 60 inches. A few small areas have marl, coprogenous earth, or both in the lower part of the substratum. In some areas the soil does not have organic deposits and has a thicker surface soil.

Included with this soil in mapping are some small areas of the very poorly drained Gilford soils. These soils have less clay in the solum than the Wallkill Variant soil and do not have organic deposits. They are in the slightly higher areas. Also included are the well drained Oakville soils in the more sloping areas. Included soils make up about 5 percent of the map unit.

The available water capacity is very high in the Wallkill Variant soil. Permeability is moderately slow in the mineral layers and moderately slow to moderately rapid in the organic layers. The content of organic matter in the surface layer is very high. Runoff is very slow or ponded. The water table is at or above the surface from late winter through spring.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

This soil is fairly well suited to corn, soybeans, and small grain. Wetness and ponding are the main management concerns. Ponded areas hinder the use of equipment, and machinery bogs down in this soil when it is wet. The surface layer is firm. If it is tilled when wet, large clods may form. The clods become hard when they dry. The cloddiness makes preparing a seedbed difficult. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring, thus allowing the planting of longer season varieties of adapted crops. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Pumping can be used in areas where a suitable outlet is not available. Because of the clayey material in the subsoil, tile lines in subsurface drainage systems should be closely spaced. Because the soil is unstable, caution is advised if heavy equipment is used near open ditches. Crop residue management, cover crops, and green manure crops help to maintain or improve tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to fall plowing, fall chisel, and ridge-till cropping systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. The ponding, frost heaving, and excess water

are management concerns. Overgrazing and grazing during wet periods are also major concerns. Water management practices, such as drainage, are necessary for high yields of hay and pasture. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Water-tolerant species are best suited to this soil. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the ponding, this soil is generally unsuited to dwellings and sanitary facilities. Because of the ponding, the potential for frost action, and low strength, it is severely limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action and by ponding. Removing the organic material and providing coarse grained subgrade or base material help to prevent the damage caused by low strength and by frost action.

The land capability classification is IIIw. No woodland ordination symbol is assigned.

WeA—Watseka loamy sand, 0 to 1 percent slopes. This very deep, nearly level, somewhat poorly drained soil is on slightly convex rises. Individual areas are long and irregularly shaped. They range from 3 to 200 acres in size. The dominant size is about 10 acres.

Typically, the surface layer is black loamy sand about 10 inches thick. The subsoil is about 23 inches thick. The upper part is brown, very friable loamy sand; the next part is brown, mottled, very friable sand; and the lower part is grayish brown, mottled, very friable sand. The substratum to a depth of about 60 inches is dark gray and gray sand. In some areas the surface layer is not thick and dark. In a few places the gray colors in the lower part of the subsoil and in the substratum are masked by iron stains.

Included with this soil in mapping are a few small areas of the very poorly drained Maumee soils. These soils are lower on the landscape than the Watseka soil. Also included are areas of the moderately well drained Nesius and excessively drained Sparta soils in the higher areas. Included soils make up about 12 percent of the map unit.

The available water capacity is low in the Watseka soil. Permeability is rapid. The content of organic matter in the surface layer is moderately low. Runoff is very slow. The seasonal high water table is at a depth of 1 to 3 feet from late winter through spring.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

This soil is fairly well suited to corn, soybeans, and small grain. Droughtiness, soil blowing, and wetness are the main management concerns. Irrigation systems can reduce seasonal crop stress and increase crop yields. Droughtiness can be minimized by controlling the water table with subsurface irrigation. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. The wetness can be reduced by controlling the water table with open ditches, surface drains, and subsurface drains. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. Excessive drainage by the subsurface drainage system may cause droughtiness. Crop residue management, cover crops, and green manure crops help to maintain or improve the content of organic matter. This soil is well suited to the ridge-till cropping system.

This soil is well suited to grasses and legumes, such as orchardgrass and ladino clover, for hay and pasture. Soil blowing and droughtiness are hazards. Excess water can be removed by surface drains, subsurface drains, or a combination of these practices. Irrigation can reduce droughtiness. Overgrazing and grazing during wet periods are also major concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the wetness, this soil is severely limited as a site for dwellings. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness.

Because of the wetness and the potential for frost

action, this soil is moderately limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to minimize the damage caused by frost action and by wetness. Providing coarse grained subgrade or base material also helps to prevent the damage caused by frost action.

Because of the wetness and poor filtering qualities, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the poor filtering capacity.

The land capability classification is IIIs. No woodland ordination symbol is assigned.

WkA—Wesley fine sandy loam, 0 to 1 percent slopes. This very deep, nearly level, somewhat poorly drained soil is on slightly convex rises. Individual areas are irregularly shaped and range from 5 to 35 acres in size. The dominant size is about 15 acres.

Typically, the surface layer is very dark grayish brown fine sandy loam about 9 inches thick. The subsurface layer is very dark grayish brown fine sandy loam about 5 inches thick. The subsoil is about 34 inches thick. The upper part is dark yellowish brown and brown, mottled, friable fine sandy loam that has strata of loamy fine sand. The lower part is olive gray, mottled, firm silty clay loam. The substratum to a depth of about 60 inches is gray, mottled silty clay loam. In places the lower part of the solum and the substratum contain less clay. In a few areas less sand is in the upper part of the solum. In a few places the upper part of the subsoil is brown. In some areas the substratum is stratified sands and loams.

Included with this soil in mapping are small areas of the very poorly drained Iroquois soils in the lower positions on the landscape and the moderately well drained Simonin soils in the slightly higher positions. Included soils make up about 6 percent of the map unit.

The available water capacity is high in the Wesley soil. Permeability is moderately rapid or rapid in the upper part of the solum and moderately slow in the lower part of the solum and in the substratum. The content of organic matter in the surface layer is moderate. Runoff is slow. The seasonal high water table is at a depth of 1 to 3 feet during late winter and spring.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness and soil blowing are the main management concerns. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring. The wetness can be reduced by controlling the water table with open ditches, surface drains, and subsurface drains. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. Cover crops, green manure crops, and crop residue management help to maintain tilth, increase the rate of water infiltration, improve aeration, and increase the content of organic matter. This soil is well suited to no-till and ridge-till cropping systems.

This soil is well suited to grasses and legumes, such as orchardgrass and ladino clover, for hay and pasture. Soil blowing, excess water, and frost heaving are management concerns. The excess water can be removed by surface drains, subsurface drains, or a combination of these practices. Overgrazing and grazing during wet periods are also major concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted legumes. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the wetness, this soil is severely limited as a site for dwellings. Adequate surface and subsurface drainage helps to overcome the wetness. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness.

Because of low strength and the potential for frost action, this soil is severely limited as a site for local roads and streets. The upper layer of the soil should be replaced or strengthened with a more suitable base material. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action. Providing coarse grained subgrade or base material helps to prevent the damage caused by low strength and frost action.

Because of the wetness, the restricted permeability, and poor filtering qualities, this soil is severely limited

as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with a suitable fill material improves the capacity of the absorption field and helps to overcome the wetness, the poor filtering capacity, and the restricted permeability.

The land capability classification is IIw. No woodland ordination symbol is assigned.

ZaA—Zaborosky fine sand, 0 to 2 percent slopes. This very deep, nearly level, somewhat poorly drained soil is on slightly convex rises in old lake beds. Individual areas are elongated or oval. They range from 15 to 300 acres in size. The dominant size is about 80 acres.

Typically, the surface layer is very dark gray fine sand about 8 inches thick. The next layer is pale brown, mottled fine sand about 15 inches thick. Below this is a buried surface layer of black loamy sand that has strata of black muck. It is about 9 inches thick. The substratum extends to a depth of about 60 inches. It is brown, mottled fine sand in the upper part and yellowish brown, mottled sand in the lower part. In a few places the soil does not have a buried surface layer. In a few areas no gray mottles are directly below the surface layer. In some places the soil is calcareous in the upper part. Some areas have slopes of more than 2 percent.

Included with this soil in mapping are small areas of the very poorly drained Conrad and Kentland soils. These soils are in the lower positions on the landscape. They make up about 10 percent of the map unit.

The available water capacity is low in the Zaborosky soil. Permeability is rapid. The content of organic matter in the surface layer is moderately low. Runoff is very slow. The seasonal high water table is at a depth of 1 to 2 feet from late fall through early spring.

Most areas are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

This soil is fairly well suited to corn, soybeans, and small grain. Droughtiness, soil blowing, and wetness are the main management concerns. Irrigation systems can reduce seasonal crop stress and increase crop yields. Droughtiness can be minimized by controlling the water table with subsurface irrigation. The wetness can be reduced by controlling the water table with open ditches, surface drains, and subsurface drains. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. Excessive drainage by the subsurface drainage system may cause droughtiness. The hazard of soil blowing can be reduced by using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Crop residue management, cover crops, and green manure crops help to maintain or improve the content of organic matter. This soil is well suited to the ridge-till cropping system.

This soil is well suited to grasses and legumes, such as orchardgrass and ladino clover, for hay or pasture. Soil blowing, droughtiness, excess water, and frost heaving are management concerns. The excess water can be removed by surface drains, subsurface drains, or a combination of these practices. Irrigation can reduce droughtiness. Overgrazing and grazing during wet periods are also major concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted legumes. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

Because of the wetness, this soil is severely limited as a site for dwellings. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness.

Because of the wetness, this soil is moderately limited as a site for local roads and streets. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action and by wetness. Providing coarse grained subgrade or base material also helps to prevent the damage caused by wetness.

Because of the wetness and poor filtering qualities, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains around the filter field help to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the poor filtering capacity.

The land capability classification is IIIs. No woodland ordination symbol is assigned.

ZbB—Zaborosky-Oakville, moderately wet, complex, 2 to 9 percent slopes, undulating. This map unit consists of very deep, nearly level to moderately sloping, somewhat poorly drained and moderately well drained soils on convex rises and knolls. The Zaborosky soil is typically on foot slopes and toe slopes, and the Oakville soil is on summits and side slopes. Individual areas of these soils are long and narrow. They range from 40 to more than 1,000 acres in size. The dominant size is about 250 acres. The areas are about 50 percent Zaborosky soil and 30 percent Oakville soil. The two soils occur as areas so intricately mixed or so small that it is not practical to separate them in mapping.

Typically, the surface layer of the Zaborosky soil is dark gray fine sand about 4 inches thick. The next layer is brown and light yellowish brown, mottled fine sand about 28 inches thick. Below this is a buried surface layer of very dark gray loamy fine sand. It is about 10 inches thick. The substratum to a depth of about 60 inches is dark brown and dark yellowish brown, mottled fine sand. In some areas the soil does not have a buried surface layer. In a few places no gray mottles are directly below the surface layer. In a few areas the soil is calcareous in the upper part. Some areas have slopes of less than 2 percent or more than 9 percent.

Typically, the surface layer of the Oakville soil is dark gray fine sand about 4 inches thick. The subsoil is brown fine sand about 24 inches thick. The substratum to a depth of about 60 inches is pale brown and light yellowish brown, mottled fine sand. In places the subsoil has thin textural bands of loamy fine sand. In some areas the dark surface layer is thicker. In places the soil is browner throughout. Some areas have slopes of less than 2 percent or more than 9 percent.

Included with these soils in mapping are small areas of the very poorly drained Conrad and Kentland soils. These included soils are in the lower positions on the landscape. Also included are areas of the moderately well drained Brems soils. Brems soils have gray mottles in the subsoil. They are in the slightly lower positions on the landscape. Included soils make up about 10 percent of the map unit.

The available water capacity is low in the Zaborosky and Oakville soils. Permeability is rapid. The content of organic matter in the surface layer is moderately low. Runoff is very slow on the Zaborosky soil and slow on the Oakville soil. The Zaborosky soil has a seasonal high water table at a depth of 1 to 2 feet in late fall and early spring. The Oakville soil has a seasonal high water table at a depth of 3 to 6 feet in late fall and early spring.

Most areas are used for pasture, woodland, or wildlife habitat. A few areas are used for cultivated crops.

The Zaborosky soil is fairly well suited to corn, soybeans, and small grain, but the Oakville soil is poorly suited. Droughtiness and soil blowing are the main management concerns. Wetness is also a concern in areas of the Zaborosky soil. Irrigation systems can reduce seasonal crop stress and increase crop yields. The wetness can be reduced by controlling the water table with open ditches, surface drains, and subsurface drains. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. Excessive drainage by the subsurface drainage system may cause droughtiness. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Crop residue management, cover crops, and green manure crops help to maintain or improve the content of organic matter. These soils are well suited to the ridge-till cropping system.

The Zaborosky soil is well suited to grasses and legumes, such as orchardgrass and ladino clover, for hay and pasture. The Oakville soil is well suited to pasture and is fairly well suited to hay. Soil blowing, droughtiness, excess water, and frost heaving are management concerns in areas of the Zaborosky soil. The excess water can be removed by surface drains, subsurface drains, or a combination of these practices. Irrigation can reduce droughtiness. Overgrazing and grazing during wet periods are also major concerns. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted legumes. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

The Oakville soil is fairly well suited to trees. The main management concerns are equipment limitations, seedling mortality, and plant competition. Because the soil is sandy, equipment tends to bog down during very dry periods. Planting more trees than is necessary can compensate for seedling mortality, but thinning may be

required later. The seedling mortality rate can also be reduced by using containerized stock or planting larger stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Pines, which have a deep taproot system, generally grow well on the Oakville soil. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the wetness, the Zaborosky soil is severely limited as a site for dwellings. The Oakville soil is suitable as a site for dwellings without basements but is moderately limited as a site for dwellings with basements because of the wetness. Surface drains, foundation drains, and landscaping that removes runoff lower the water table and help to overcome the wetness. Building houses on elevated, well compacted fill material also helps to overcome the wetness.

Because of the wetness, the Zaborosky soil is moderately limited as a site for local roads and streets. The Oakville soil is suitable for these uses. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to minimize the damage caused by wetness.

Because of the wetness and poor filtering qualities, these soils are severely limited as sites for septic tank absorption fields. Installing perimeter drains around the filter field helps to lower the water table. Filling or mounding with suitable filtering material improves the capacity of the absorption field and helps to overcome the wetness and the poor filtering capacity.

The land capability classification is IIIs for the Zaborosky soil and IVs for the Oakville soil. The woodland ordination symbol is 4S for the Oakville soil. No woodland ordination symbol is assigned for the Zaborosky soil.

Zg—Zadog-Granby complex. This map unit consists of very deep, nearly level, very poorly drained soils in broad depressional areas. The Zadog soil is in the lower lying areas, and the Granby soil is on the margins of the mapped areas or on very slight rises. The soils are frequently ponded for brief periods by surface runoff from surrounding soils. Individual areas are broad and irregularly shaped and range from 20 to 300 acres in size. The dominant size is about 100 acres. The areas are about 50 percent Zadog soil and 40 percent Granby soil. The two soils occur as areas so intricately mixed or so small that it is not practical to separate them in mapping.

Typically, the surface layer of the Zadog soil is black loamy sand about 10 inches thick. The subsurface layer is black, mottled fine sandy loam about 5 inches thick. The subsoil is about 15 inches thick. It is brown, mottled, friable fine sandy loam in the upper part; reddish brown, mottled, friable sandy clay loam in the next part; and grayish brown, mottled, friable fine sandy loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown and strong brown, mottled fine sand. In some places the solum is more acid. In some areas the solum does not have iron nodules. In a few places a layer of loam or clay loam is in the subsoil. In some areas the surface layer is mucky loamy sand.

Typically, the surface layer of the Granby soil is black loamy fine sand about 10 inches thick. The subsoil is about 21 inches thick. It is dark gray, mottled, very friable fine sand in the upper part and pale brown and gray, mottled, very friable sand in the lower part. The substratum to a depth of about 60 inches is grayish brown, mottled sand. In some places the dark surface layer is less than 10 inches thick. In a few areas the subsoil has a layer of loam or clay loam.

Included with these soils in mapping are a few small areas of the somewhat poorly drained Morocco soils in the slightly higher positions on the landscape and areas of the very poorly drained Adrian and Maumee soils in the slightly lower positions. Adrian soils have muck in the upper part of the profile. Maumee soils have a thicker surface soil than the major soils. Included soils make up about 15 percent of the map unit.

The available water capacity is low in the Zadog and Granby soils. Permeability is moderate in the solum of the Zadog soil and rapid in the substratum. It is rapid in the Granby soil. The content of organic matter in the surface layer of both soils is moderate. Runoff is very slow or ponded. The seasonal high water table is at or above the surface from late winter through spring.

Most areas are used for cultivated crops. A few areas are used for woodland and pasture.

These soils are fairly well suited to corn, soybeans, and small grain. Wetness, ponding, soil blowing, and droughtiness are the main management concerns. A drainage system helps to lower the water table and raises the temperature of the soil more quickly in the spring, thus allowing the planting of longer season varieties of adapted crops. The wetness can be reduced by controlling the water table with open ditches, surface drains, subsurface drains, or a combination of these practices. Pumping can also be used in areas where a suitable outlet is not available. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Using a finely meshed filter to cover drainage tile helps to prevent the

tile from filling with sediments. Excessive drainage by the subsurface drainage system may cause droughtiness. Because cutbanks are unstable, caution is advised if heavy equipment is used near open excavations. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves all or part of the crop residue on the surface, planting buffer strips or vegetative barriers, or ridging at an angle to the prevailing wind; by using a combination of these practices; or by maintaining a permanent cover of vegetation. Irrigation systems can reduce seasonal crop stress and increase crop yields. Crop residue management, cover crops, and green manure crops help to maintain or improve tilth and the content of organic matter. These soils are well suited to the ridge-till cropping system.

These soils are well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay or pasture. The ponding, soil blowing, droughtiness, frost heaving, and excess water are management concerns. Overgrazing and grazing during wet periods are also major concerns. Water management practices, such as drainage and irrigation, are necessary for high yields. Overgrazing reduces plant density and hardiness. Grazing during wet periods causes surface compaction, which results in poor soil tilth, reduces forage yields, damages the sod, and reduces plant density and hardiness. Maintaining a permanent cover of grasses and legumes helps to control soil blowing. Water-tolerant species are best suited to this soil. Proper stocking rates, timely deferment of grazing, restricted use during wet periods, and rotation grazing help to minimize surface compaction, maintain good plant density and hardiness, and keep the pasture in good condition.

These soils are fairly well suited to trees. The main management concerns are equipment limitations, the windthrow hazard, and plant competition. Seedling mortality is an additional concern in areas of the Granby soil. The equipment limitations can be overcome by delaying timber harvest until dry periods or until the soil is frozen. Planting more trees than is necessary can compensate for seedling mortality, but thinning may be required later. The seedling mortality rate can also be reduced by using containerized stock or planting larger stock. Harvest methods that leave some mature trees to provide shade and protection for seedlings may be needed. Seedlings survive and grow well if competing vegetation is controlled. Selecting water-tolerant species helps to overcome the windthrow hazard. Harvest methods that do not leave the remaining trees isolated or widely spaced should be used. Care should be taken to avoid damaging the surficial root systems of unharvested trees. Site preparation and the control or removal of unwanted trees and shrubs can be accomplished by spraying, cutting, or girdling. Additional management practices include keeping livestock from the woodland, harvesting mature trees, and saving desired seed trees.

Because of the ponding, these soils are generally unsuited to dwellings and sanitary facilities and are severely limited as sites for local roads and streets. The potential for frost action is an additional limitation affecting local roads and streets in areas of the Zadog soil. Maintaining a crown in roads and streets, constructing the roads and streets on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by frost action and by ponding. Providing coarse grained subgrade or base material also helps to prevent the damage caused by frost action.

The land capability classification is IIIw. The woodland ordination symbol is 4W.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban or built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal expenditure of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the

Figure 15.—This area of gently sloping Foresman soils is considered prime farmland.

criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 146,000 acres in the survey area, or nearly 57 percent of the total acreage, meets the soil requirements for prime farmland. Scattered areas of this land are throughout the county, but most are in the southern part, mainly in associations 7, 8, 9, 10, 11, and 12, which are described under the heading "General Soil Map Units." Nearly all of this prime farmland is used for corn or soybeans (fig. 15).

A recent trend in land use in some parts of the county has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps that accompany this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Some soils that have a seasonal high water table and all soils that are frequently flooded during the growing season qualify as prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. The need for these measures is indicated after the map unit name in table 5. Onsite evaluation is needed to determine whether or not these limitations have been overcome by corrective measures.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations that affect various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Crops and Pasture

William L. Veldt, district conservationist, Natural Resources Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the estimated yields of the main crops and hay and pasture plants are listed for each soil; and the system of land capability classification used by the Natural Resources Conservation Service is explained.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

In 1987, about 205,612 acres in Newton County was used as cropland. Of this acreage, 194,325 acres was harvested cropland, mainly corn, soybeans, and wheat; 10,000 acres was used for pasture; and 1,287 acres was used for other crops. An additional 8,300 acres of farmland was used as woodland.

An estimated 32,800 acres, or 12.7 percent of the county, consisted of urban or built-up land in 1987. This land includes roads, railroads, cemeteries, and airports; acreage in towns, villages, and farmsteads; and land used for rural development.

The potential for increased food production in Newton County is low. Food production could be increased by extending the latest crop production technology to all of the cropland in the county. This soil survey can facilitate the application of such technology.

Optimal land use requires careful planning and good management. The following paragraphs describe some of the most common soil limitations in Newton County.

The major management concerns affecting crops and pasture in Newton County are controlling erosion; controlling flooding, wetness, and ponding; reducing the effects of droughtiness; and maintaining or improving soil tilth, soil fertility, and the content of organic matter. Most of the soils in the county are subject to more than one limitation or management concern. Erosion and wetness, for example, are concerns in many areas in the northern part of the county. Maumee and Morocco soils are examples of the soils in these areas.

About 55 percent of the county is subject to erosion. Erosion results in the pollution of streams by sediments, plant nutrients, and farm chemicals. Correcting the effects of this sedimentation is generally costly. Controlling erosion on farmland helps to prevent the pollution of streams and improves the quality of water for municipal and recreational uses and for fish and wildlife.

Two major forms of erosion are common in Newton County. These are soil blowing and water erosion. Areas that have slopes of more than 2 percent generally are susceptible to water erosion. The common types of water erosion are gully erosion, rill erosion, and sheet erosion. Soils that have a surface layer of sandy material or organic material are susceptible to soil blowing if the surface is not protected by a cover of vegetation. Many soils are subject to both kinds of erosion.

Conservation tillage methods that leave all or part of the crop residue on the surface, such as no-till farming, help to control erosion on cropland. Other conservation practices include terraces, diversions, critical-area plantings, cover crops, green manure crops, and a cropping system that rotates grasses or close-growing plants with row crops. The use of conservation tillage is increasing in the county. No-till farming and ridge-till planting are effective in controlling soil blowing and water erosion (fig. 16). These methods can be used on most of the soils in the county (Galloway and others, 1977).

Water- and sediment-control basins are effective in reducing the hazard of rill or gully erosion. They are most practical on deep, well drained soils that are highly susceptible to erosion, such as Octagon soils. Using these basins minimizes the amount of soil loss and the associated loss of soil nutrients; helps to prevent crop damage and pollution of streams caused by sedimentation; reduces the need for grassed waterways, which take up space that could otherwise be used for row crops; and reduces the amount of pesticides entering watercourses.

Soil blowing is a hazard in areas of sandy soils, such as Tedrow soils, and in areas of organic soils, such as Toto muck. It occurs when the wind dislodges soil particles with enough velocity to move the particles. The distance that the soil particles travel depends on the wind velocity and the size, shape, and density of the soil particles. Three modes of transport are associated with this type of erosion. These are saltation, suspension, and surface creep. Surface creep and suspension are caused by saltation. Saltation is a kind of particle movement, caused by the wind, in which the particles skip or bounce across a soil surface. Most particles or aggregates moved in saltation are 0.1 to 0.5 millimeter in size. The movement of the soil removes silt, clay, and organic matter from the surface soil and leaves the coarse sand and other less fertile materials behind. If sandy soils and organic soils are moldboard plowed, they are very susceptible to soil blowing.

In late spring and early summer, young plants and seedlings may be severely damaged or even killed as a result of soil blowing. The soil blowing occurs mainly in spring, when winds are strong. The soils in fields that are not protected by a vegetative cover are susceptible to soil blowing. Early in spring, soil blowing is most common in areas of cultivated soils. Later in the spring, the soil blowing occurs in fields of young crops. It can cause severe damage to these crops, especially to soybeans and most specialty crops.

Maintaining a protective cover of vegetation, leaving crop residue on the surface, or using a tillage system that leaves the surface rough can reduce the hazard of soil blowing. Planting cover crops and using a system of conservation tillage are effective methods of controlling soil blowing in Newton County.

Windbreaks of adapted trees, shrubs, and some grasses are also effective in controlling soil blowing. Field windbreaks are generally planted on the west side of the field. More information about windbreaks and desirable species for planting is available in the section "Windbreaks and Environmental Plantings."

Wetness is the major management concern on about 65 percent of the cropland in Newton County. The northern one-third of the county is drained by the Kankakee River and its tributaries. The rest of the county is drained mainly by the Iroquois River and Beaver Creek and their tributaries. Most areas of very poorly drained soils, such as Maumee, Gilford, and Zadog soils, have been adequately drained for farming. A few areas of these soils, however, cannot be drained economically. They are in depressions or drainage outlets that would have to be deepened and extended great distances for proper drainage. Many of the depressional areas are covered with water for brief periods in the spring. In these areas, crop growth may be retarded or the crop may be killed by the ponding.

Somewhat poorly drained soils, such as Darroch, Gilboa, Strole, Watseka, and Zaborosky soils, also are

Figure 16.—No-till soybeans planted in corn residue in an area of the gently sloping Papineau soils.

subject to wetness. Unless these soils are artificially drained, they are so wet that crops are damaged during most years.

Well drained soils, such as Martinsville soils, generally have good natural drainage but tend to dry out slowly after rains. Small areas of wetter soils in swales or depressions or along drainageways are commonly included in mapping with these soils. Artificial drainage is needed in these wetter areas.

Some soils have sandy textures below a depth of 30 inches. Examples are Craigmile, Gilford, Granby, and Zadog soils. Using a finely meshed filter to cover drainage tile helps to prevent the tile from filling with sediments in areas of these soils. After the tile is installed, placing part of the surface layer or some organic material directly over the tile and its protective covering helps to keep sand from clogging the tile openings or the protective covering. Excessive drainage by subsurface drainage systems may cause droughtiness. Using water management practices, such as irrigation, drainage, or a combination of the two, is necessary for high yields of adapted crops.

Special drainage systems are needed to control the water table in areas of organic soils, such as Adrian, Houghton, and Toto soils (Sinclair and others, 1984). The design of the drainage system should maintain the water table at the level required by crops during the growing season and raise the water table to the surface during the rest of the year. Such systems minimize the oxidation and subsidence of the organic material and reduce the hazard of soil blowing. Oxidation and subsidence occur when pore spaces are filled with air. Subsidence can cause tile to settle and move out of alignment. In some areas, water inlets to the tile can become plugged with material as a result of chemical and biological reactions in the soil. Continuous lines of tile may be more suitable in organic soils than individual small sections of tile. Also, tile lines that have large holes are less likely to become plugged than those with small holes.

Installing a drainage system can be particularly difficult in some organic soils, such as Ackerman, Martisco Variant, and Toto soils. These soils contain marl or coprogenous earth. If the coprogenous earth is allowed to dry out, it is extremely difficult to rewet. If the organic material or the marl is lost because of soil blowing, oxidation, or subsidence, the coprogenous earth may be exposed at the surface. The surface layer

then becomes cloddy and is very difficult to use as a plant medium.

Flooding is a major management concern along the Iroquois and Kankakee Rivers. Some soils are frequently flooded for several days in early spring and late fall. Craigmile and Sawabash soils are examples. Dikes and levees protect most areas adjacent to the Kankakee River from flooding. Because of the flooding and ponding, most perennial legumes are not suitable for planting in areas of these soils. Water-tolerant species are more suitable in these areas. If small grain is planted in the fall, it is subject to severe damage during periods of prolonged flooding. Using short-season varieties of adapted crops helps to minimize the damage caused by flooding. Late planting of crops can prevent loss or damage caused by flooding in the spring. More information on drainage and flood control is available at the local office of the Natural Resources Conservation Service.

Droughtiness is a problem on about 50 percent of the cropland in the county. Most of the droughty soils are in the northern one-half of the county. Soil moisture can be conserved by using conservation practices, such as crop residue management and systems of conservation tillage that leave a protective cover of crop residue on the surface. Droughtiness can be minimized on some soils, such as Gilford, Morocco, Prochaska, and Watseka soils, by installing a combination of drainage and irrigation systems. Open ditches combined with water-control structures are examples.

Irrigation systems can reduce the effects of droughtiness, soil blowing, and frost action. They can also minimize plant stress during the summer months and increase crop yields. Irrigation is being used on many droughty soils in Newton County (fig. 17). In areas where the soils have an available water capacity of 5 inches or less within a depth of 40 inches, yields can be expected to respond to irrigation at least 3 or 4 years out of 5. Yields may increase by a large percentage in areas where the soils are dominantly sand, fine sand, loamy fine sand, loamy sand, loam, sandy loam, fine sandy loam, or silt loam. More detailed information about irrigated crop yields is available from the local office of the Natural Resources Conservation Service.

Soil tilth is an important factor in the germination of seeds and the infiltration of water into the soil. Soils that have good tilth are granular and porous and contain a sufficient amount of organic matter. In soils that have a surface layer of clay loam, silty clay loam, silty clay, or clay, tilth can improve as a result of the freezing and thawing action of the soil during the winter. Using farm equipment during periods when the moisture content of the soil is too high can cause surface compaction and can destroy soil tilth.

Some of the soils used for crops in Newton County have a loamy surface layer that has a moderately low or low content of organic matter. Generally, these soils have weak or moderate structure. Intense rainfall can cause the formation of a crust on the surface of these soils. The crust becomes very hard when dry, and thus the rate of water infiltration can be reduced. As a result, the runoff rate increases. Leaving crop residue on the surface and regularly adding manure and other organic material improve soil structure and help to prevent the formation of a crust (Galloway, 1978).

The content of clay is high in the dark Montgomery soils. Maintaining tilth is a problem in these soils because they often stay wet until late in the spring. If farmed when wet, they tend to be very cloddy. The cloddiness makes preparing a good seedbed difficult.

Soil fertility is an important component of crop production. Most of the soils in the county respond well to additions of nitrate, phosphate, and potash. Nitrogen generally has a pronounced effect on crop production. The amount of nitrogen in the soil also tends to regulate the amounts of phosphorus and potassium used by plants. Organic matter is an important source of nitrogen for crops. Generally, the darker the soil, the higher the content of organic matter and the levels of nitrogen. Nitrogen can be added to the soil by growing legumes or by adding nitrogen fertilizer.

Phosphorus is a critical element in the growth of plants. Additions of phosphorus are generally needed to increase crop yields. Many of the soils in the county have a low supply of potassium. Sandy and organic soils are more likely than clayey and loamy soils to need additions of potash. Also, poorly drained soils and soils that have an impervious subsoil are more likely to need potash fertilizer than deep, well aerated soils.

The degree of acidity in the soil is also an indication of the fertility level. Very acid soils may have a good supply of plant nutrients but may not be productive. Additions of lime may be needed in order for these soils to respond to nitrogen, phosphorus, or potassium.

On all soils, additions of lime and fertilizer should be based on the needs of the crop, on the expected yields, and on the results of soil tests. Information about soil testing and plant nutrient levels is available at the local office of the Cooperative Extension Service.

The major field crops in Newton County are corn and soybeans. Seed corn and soybeans for seed are also grown, mainly in the southern part of the county. Wheat, rye, and oats are the common close-growing crops, but they are grown only to a limited extent. Field crops suited to the soils and climate of the survey area

Figure 17.—Irrigation helps to prevent seasonal crop stress in this area of Brems soil

include many that are not commonly grown. Buckwheat sorghum, and sunflowers are examples. Also, hay or seed could be produced from bromegrass, fescue, redtop, and bluegrass

Permanent pasture is a minor land use in the county Maintaining a permanent cover of grasses and legumes slows runoff and helps to control soil blowing and water erosion

Many coarse textured soils are well suited to grasses and legumes for hay and pasture. Nesius and Oakville soils are examples. Controlling erosion and runoff is the main management concern in areas of these soils. Also,

insufficient moisture during the summer causes the soils to become droughty. Deep-rooted legumes and drought-tolerant species should be selected for hay and pasture. Smooth bromegrass, red fescue, tall fescue, sudangrass, and switchgrass are the grass species best suited to these soils. Kentucky bluegrass, field bromegrass, ryegrass, and timothy are the least suited species. Legumes that are suited to these soils include sweet clover, alfalfa, and lespedeza. Crimson clover, ladino clover, red clover, birdsfoot trefoil, and white clover are generally not well suited. Using a continuous small grain rotation or including grasses and legumes in a rotation with small grain helps to control erosion in these areas. Irrigation may be necessary for the highest yields of hay or pasture plants.

Soils that are somewhat poorly drained, poorly drained, or very poorly drained and have a low available water capacity need both a drainage system and an irrigation system if the desired yields of hay and pasture crops are to be achieved. The species of grasses and legumes selected for planting should be those that can withstand the seasonal high water table in late fall and early spring and the extremely droughty conditions during the summer. Reed canarygrass, tall fescue, redtop, sudangrass, switchgrass, and birdsfoot trefoil are generally the best suited species in areas of these soils. Wetness is also a concern in these areas. Water-tolerant species should be selected. Suitable grasses include reed canarygrass and redtop, and suitable legumes include ladino clover, white clover, and birdsfoot trefoil. Subsurface drainage or other water management practices may be needed.

Controlling runoff and erosion is a concern in gently sloping areas of moderately well drained or well drained soils, such as Barce and Octagon soils. Most species of grasses and legumes are suitable in areas of these soils. Generally, Kentucky bluegrass, field bromegrass, smooth bromegrass, tall fescue, orchardgrass, and timothy are the grass species recommended for seeding mixtures. Alfalfa, red clover, ladino clover, alsike clover, and birdsfoot trefoil are the best suited legumes.

Specialty crops are important in Newton County. These include Christmas trees, mint, and a variety of fruits and vegetables. Apples and blueberries are the main fruits grown. The most common vegetables are asparagus and pumpkins. Watermelons are also commonly grown. Christmas trees are commonly grown on sandy ridges where the soils have good internal drainage (fig. 18). Most of the fruits, vegetables, and mint are grown in drained areas of sandy or organic soils in the northern part of the county.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Figure 18.—Christmas trees grow well in this area of Oakville fine sand, 6 to 15 percent slopes.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is shown in table 7. The capability classification of the map units in this survey area is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

Gary L. Maners, forester, Natural Resources Conservation Service, helped prepare this section.

Hardwood forests once covered many areas of Newton County. In recent years, however, areas that are suitable for cultivation have been cleared. Most of the remaining woodland is scattered throughout the northern half of the county and is in areas of droughty, sandy soils. Bur oak, black oak, white oak, jack oak, sassafras, and a few scattered hickories are on sandy ridges. Pin oak grows at the base of knolls in many areas. The wetter, lower lying areas support stands of pin oak, bur oak, jack oak, swamp white oak, black oak, white oak, red oak, hickory, black ash, white ash, American elm, silver maple, river birch, sandbar willow, black willow, cottonwood, quaking aspen, hackberry, and sycamore.

In 1987, the acreage of privately owned woodland was about 8,300 acres, or about 3.2 percent of the county. Publicly owned woodland is primarily in the LaSalle State Fish and Wildlife Area and the Willow Slough State Fish and Wildlife Area.

Many areas in Newton County have good potential for woodland. Christmas trees can be grown in areas of droughty, sandy soils. Scotch pine is well adapted to these soils. Plant competition is generally not a concern in these areas. Many of the soils in the southern part of the county are suited to the production of commercially valuable trees, but woodland is not a major land use in these areas.

If managed properly, woodland can provide a source of income on marginal land (fig. 19). Trees can be grown for timber or firewood. Establishing stands of trees also helps to control soil blowing. The woodland also provides recreational areas and habitat for wildlife.

Most established woodlots could benefit from improved management. Management practices include thinning out undesirable species and mature trees; protecting the stands from fire and from grazing by livestock; controlling disease, insects, and plant competition; and using equipment only during periods when moisture conditions are suitable.

Table 8 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; *F*, a high content of rock fragments in the soil; and *N*,

Figure 19.—A wooded area of Oakville soils.

snowpack. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, F, and N.

In table 8, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire

lanes and in log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic feet per acre per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It generally is the most common species on the soil and is the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise (fig. 20). The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 9 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 9 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and

Figure 20.—Windbreaks and environmental plantings around homes and farmsteads reduce home heating and cooling costs and conserve fuel. This farmstead windbreak is in an area of Darroch soils.

screens and planting and caring for trees and shrubs can be obtained from local offices of the Natural Resources Conservation Service or the Cooperative Extension Service or from a commercial nursery.

Recreation

Most of the recreational areas in Newton County are owned by private individuals or managed by cities and towns. Activities available include horseback riding, snowmobiling, hunting, fishing, camping, hiking, canoeing, bicycling, bird watching, and golf.

State-owned areas, such as the Willow Slough State Fish and Wildlife Area and the LaSalle State Fish and Wildlife Area, also offer numerous recreational opportunities.

Many areas of the county have good potential for the development of recreational areas. The northern part of the county has easy access to Chicago, Illinois, and Gary, Indiana. The Kankakee River and many of the wooded knolls provide a variety of possibilities for recreational development. The Iroquois River and the wooded areas north of Kentland offer opportunities for recreational development in the southern part of the

county. These areas are easily accessible from Lafayette and surrounding communities.

The soils of the survey area are rated in table 10 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 10, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in table 10 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 13 and interpretations for dwellings without basements and for local roads and streets in table 12.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

James D. McCall, wildlife biologist, Natural Resources Conservation Service, helped prepare this section.

Buffalo, elk, and wild boars once roamed the prairies of the survey area. Forested areas were alive with deer, grouse, and wild turkeys. Wetland areas supported beaver, fox, mink, muskrat, and raccoon. Historical accounts describe lakes filled with northern pike and buffalo, a member of the sucker family. In the spring and fall, many shallow water areas were inhabited by ducks, geese, sandhill cranes, and trumpeter swans during their annual migrations. The area also supported predators, such as cougar, wildcats, and wolves. As the habitat available to wildlife began to be converted to other uses, the numbers of all of these animals declined.

Today, habitat for wildlife can be created or improved by proper management. Such management includes providing the necessary food and shelter by increasing and diversifying food supplies, water, and cover and providing travel lanes.

A few farms in Newton County have a good balance between cover and food for wildlife. Many farms are used almost entirely for row crops. Other areas are largely pasture or woodland, which furnishes ample cover but insufficient food for wildlife. A well planned and well managed system of agriculture maintains productivity but also contributes to the natural system.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and

abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 11, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and soybeans.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, bromegrass, timothy, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, ragweed, crabgrass, dandelion, and dock.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, river birch, maple, cherry, willow, walnut, apple, hawthorn, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, cattails, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, robin, red-winged blackbird, meadowlark, field sparrow, cottontail, woodchuck, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include woodcock, thrushes, woodpeckers, weasels, skunks, opossum, squirrels, gray fox, raccoon, and white-tailed deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas (fig. 21). Some of the wildlife attracted to such areas are ducks, geese, shore birds, rails, kingfishers, muskrat, mink, and beaver.

Edge habitat is a transition zone between one primary land use or cover type and another. Edge habitat is not rated in table 11 but is of prime importance to birds and mammals. Many animals that inhabit openland or woodland areas also frequent areas of edge habitat. The variety of plant species in areas of edge habitat is large. Examples of edge habitat include the border between a no-till field of corn and the outer edge of a dense stand of trees and an irregular or deeply indented border, such as one between a wooded area and a meadow.

Engineering

Jeffry Healy, state conservation engineer, Natural Resources Conservation Service, helped prepare this section.

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by professionals experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 12 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to

Figure 21.—This excavated pond in an area of Gilford soils provides excellent habitat for wetland wildlife.

bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a

high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 13 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 13 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are ponds constructed to hold sewage while bacteria decompose the waste materials. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 13 gives ratings for the natural soil that makes up the lagoon floor. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to affect the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon embankment. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 13 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a

high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 14 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 14, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also

evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 15 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large

stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 19.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 16 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters

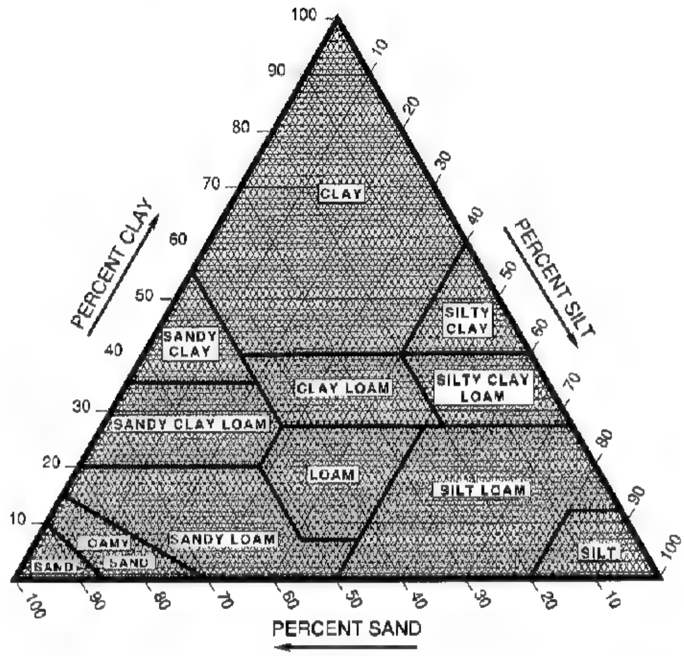

Figure 22.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

in diameter (fig. 22). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1986).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified

as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 17 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops

and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams. These soils are erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 17, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 18 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist

mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 18, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 18 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 18 are depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 18.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. Table 18 shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced

electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Engineering Index Test Data

Table 19 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The soil samples were tested by the State Highway Department of Indiana, Division of Materials and Tests.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 422 (ASTM), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 4318 (ASTM); Plasticity index—T 90 (AASHTO), D 4318 (ASTM); and Moisture density—T 99 (AASHTO), D 698 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA, 1975). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 20 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquoll (*Aqu*, meaning water, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplaquolls (*Hapl*, meaning minimal horizonation, plus *aquoll*, the suborder of the Mollisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplaquolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Typic Haplaquolls.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (USDA, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (USDA, 1975). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Ackerman Series

The Ackerman series consists of very deep, very poorly drained soils on outwash plains and lake plains.

These soils formed in organic deposits and coprogenous earth over sandy deposits. Permeability is slow in the coprogenous earth and rapid in the underlying sandy sediments. Slopes range from 0 to 2 percent.

Ackerman soils are similar to Adrian Variant and Martisco Variant soils and are adjacent to Kentland soils on the landscape. Adrian Variant and Kentland soils do not have coprogenous earth in the profile. Martisco Variant soils formed in marl and coprogenous earth over sandy deposits. Kentland soils are in landscape positions similar to those of the Ackerman soils. Martisco Variant soils are on the slightly higher rises.

Typical pedon of Ackerman muck, in an area of Ackerman-Martisco Variant complex, drained, in a cultivated field; 1,150 feet east and 1,200 feet south of the northwest corner of sec. 20, T. 30 N., R. 9 W.

Op—0 to 8 inches; sapric material, black (N 2/0) broken face and rubbed; about 40 percent fiber, less than 5 percent rubbed; moderate medium granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

Cg—8 to 14 inches; dark gray (N 4/0) coprogenous earth; common medium prominent light olive brown (2.5Y 5/4) mottles; massive; friable; white (10YR 8/1) sodium pyrophosphate extract; yellowish red (5YR 5/8) material filling old root channels; neutral; clear wavy boundary.

2C1—14 to 19 inches; light yellowish brown (10YR 6/4) sand; common medium distinct yellowish brown (10YR 5/6) mottles; single grain; loose; slight effervescence; mildly alkaline; clear wavy boundary.

2C2—19 to 31 inches; pale brown (10YR 6/3) sand; common medium distinct yellowish brown (10YR 5/6) mottles; single grain; loose; strong effervescence; moderately alkaline; clear wavy boundary.

2C3—31 to 39 inches; yellowish red (5YR 5/8) sand; common fine distinct yellowish brown (10YR 5/8) mottles; single grain; loose; strong effervescence; moderately alkaline; gradual wavy boundary.

2C4—39 to 60 inches; pale brown (10YR 6/3) sand; common medium distinct brownish yellow (10YR 6/6) mottles; single grain; loose; strong effervescence; moderately alkaline.

The sapric material ranges from 4 to 14 inches in thickness. The coprogenous earth ranges from 2 to 18 inches in thickness. Depth to the sandy material ranges from 10 to 30 inches. The organic material is primarily herbaceous.

The surface tiers have hue of 10YR, value of 2, and chroma of 1, or they are neutral in hue and have chroma of 0. The Cg horizon has hue of 10YR, 5Y, or 2.5Y, value of 3 to 5, and chroma of 1 or 2, or it is neutral in hue and has value of 4. Reaction in this horizon ranges from neutral to moderately alkaline. The 2C horizon has hue of 5YR, 7.5YR, or 10YR, value of 5 or 6, and chroma of 1 to 8. It is sand or fine sand. Reaction ranges from neutral to moderately alkaline.

Adrian Series

The Adrian series consists of very deep, very poorly drained soils on lake plains and outwash plains. These soils formed in organic deposits over sandy sediments. Permeability is moderately slow in the organic layers and rapid in the substratum. Slopes range from 0 to 2 percent.

Adrian soils are similar to Houghton and Toto soils and are adjacent to Granby soils on the landscape. Houghton soils formed in more than 51 inches of muck. Toto soils have coprogenous earth and marl in the subsurface tiers. Granby soils are sandy throughout. They are in the slightly higher landscape positions.

Typical pedon of Adrian muck, drained, in a cultivated field; 200 feet west and 900 feet north of the southeast corner of sec. 35, T. 30 N., R. 9 W.

Op—0 to 12 inches; sapric material, black (10YR 2/1) broken face, very dark brown (10YR 2/2) rubbed; about 40 percent fiber, 10 percent rubbed; moderate medium granular structure; very friable; many fine roots; primarily herbaceous fiber; neutral; abrupt smooth boundary.

Oa1—12 to 16 inches; sapric material, black (10YR 2/1) broken face, very dark grayish brown (10YR 3/2) rubbed; about 50 percent fiber, 12 percent rubbed; weak coarse subangular blocky structure; friable; many fine roots; primarily herbaceous fiber; slightly acid; gradual wavy boundary.

Oa2—16 to 30 inches; sapric material, black (10YR 2/1) broken face, very dark grayish brown (10YR 3/2) rubbed; about 55 percent fiber, 14 percent rubbed; weak thin platy structure; friable; few fine roots; primarily herbaceous fiber; medium acid; clear wavy boundary.

2Cg—30 to 60 inches; gray (10YR 5/1) sand; common medium distinct yellowish brown (10YR 5/4) mottles; single grain; loose; strong effervescence; mildly alkaline.

The organic material is primarily herbaceous. It ranges from 16 to 50 inches in thickness. The surface tier has hue of 7.5YR or 10YR, value of 2, and chroma of 1 or 2, or it is neutral in hue and has value of 2. Fiber content is dominantly less than 12 percent when rubbed. Mineral content ranges from 0 to 10 percent.

The subsurface and bottom tiers have hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3, or they are neutral in hue and have value of 2 or 3. They are primarily sapric material, but some pedons have thin layers of hemic material with a combined thickness of less than 10 inches. Fiber content is dominantly less than 15 percent when rubbed. Mineral content ranges from 0 to 4 percent. The 2C horizon has hue of 10YR, value of 5 or 6, and chroma of 1 to 3. It is sand or fine sand. Reaction ranges from medium acid to moderately alkaline.

Adrian Variant

The Adrian Variant consists of very deep, very poorly drained soils on outwash plains. These soils formed in organic deposits over sandy sediments. Permeability is moderately slow in the organic layers and rapid in the substratum. Slopes are 0 to 1 percent.

Adrian Variant soils are similar to Ackerman and Martisco Variant soils and are adjacent to Houghton soils on the landscape. Ackerman soils have coprogenous earth in the profile. Martisco Variant soils have marl and coprogenous earth in the profile. Houghton soils formed in more than 51 inches of muck. They are in the slightly lower positions on the landscape.

Typical pedon of Adrian Variant muck, drained, in a cultivated field; 2,250 feet east and 1,800 feet south of the northwest corner of sec. 2, T. 29 N., R. 9 W.

Op—0 to 11 inches; sapric material, black (N 2/0) broken face and rubbed; about 2 percent fiber, less than 1 percent rubbed; weak fine granular structure; very friable; common medium and fine roots; primarily herbaceous fiber; 10 percent mineral material; neutral; abrupt smooth boundary.

Cg—11 to 24 inches; dark gray (10YR 4/1) sand; common medium distinct yellowish brown (10YR 5/4) mottles; single grain; loose; few fine and very fine roots; neutral; gradual wavy boundary.

C—24 to 60 inches; pale brown (10YR 6/3) sand; common coarse distinct yellowish brown (10YR 5/8) mottles; single grain; loose; slight effervescence; mildly alkaline.

The sapric material ranges from 6 to 15 inches in thickness. The organic material is primarily herbaceous. The surface tiers have hue of 10YR, value of 2, and chroma of 1, or they are neutral in hue and have chroma of 0. The C horizon has hue of 10YR, 5Y, or 2.5Y, value of 3 to 6, and chroma of 1 to 3.

Algansee Series

The Algansee series consists of very deep, somewhat poorly drained, rapidly permeable soils on flood plains. These soils formed in sandy alluvium. Slopes range from 0 to 2 percent.

Algansee soils are similar to Morocco, Tedrow, Watseka, and Zaborosky soils and are adjacent to Craigmile and Prochaska soils on the landscape. Morocco, Tedrow, and Watseka soils have a regular decrease in organic carbon with increasing depth. Zaborosky soils have a buried A horizon. Craigmile and Prochaska soils are grayer in the upper part of the subsoil than the Algansee soils. Also, they are in the lower positions on the landscape.

Typical pedon of Algansee loamy sand, frequently flooded, undrained, in a wooded area; 2,640 feet east and 400 feet south of the northwest corner of sec. 8, T. 31 N., R. 9 W.

A—0 to 9 inches; dark grayish brown (10YR 4/2) loamy sand, light brownish gray (10YR 6/2) dry; weak fine granular structure; very friable; many fine roots; neutral; clear smooth boundary.

C1—9 to 19 inches; pale brown (10YR 6/3) loamy fine sand; common medium distinct grayish brown (10YR 5/2) and few fine distinct yellowish brown (10YR 5/6) mottles; massive; very friable; few fine roots; neutral; gradual smooth boundary.

C2—19 to 25 inches; yellowish brown (10YR 5/4) loamy fine sand; common medium prominent red (2.5YR 4/6) and common medium distinct light brownish gray (10YR 6/2) mottles; massive; very friable; thin strata of black (10YR 2/1) loamy fine sand totaling 2 inches; neutral; clear smooth boundary.

C3—25 to 35 inches; black (N 2/0) loamy sand; few fine distinct dark yellowish brown (10YR 4/4) mottles; massive; very friable; neutral; gradual smooth boundary.

Cg1—35 to 45 inches; gray (N 5/0) loamy sand; common medium distinct light gray (10YR 6/1) and yellowish brown (10YR 5/4) mottles; massive; very friable; neutral; gradual smooth boundary.

Cg2—45 to 52 inches; gray (N 6/0) loamy sand; common medium distinct dark gray (N 4/0) and yellowish brown (10YR 5/6) mottles; massive; very friable; thin strata of sandy loam totaling 2 inches; neutral; gradual smooth boundary.

Cg3—52 to 60 inches; gray (N 6/0) sandy loam; common medium distinct dark gray (N 4/0) mottles; massive; friable; thin strata of sand totaling 4 inches; common light olive brown (2.5Y 5/4) plant fibers; neutral.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. The C horizon has hue of 10YR, value of 4 to 6, and chroma of 2 to 4, or it is neutral in hue and has value of 2 to 6.

Aubbeenaubbee Series

The Aubbeenaubbee series consists of very deep, somewhat poorly drained soils on ground moraines. These soils formed in glaciofluvial material and glacial till. Permeability is moderately rapid in the upper part of the solum, moderate in the lower part of the solum, and slow in the substratum. Slopes range from 0 to 2 percent.

Aubbeenaubbee soils are adjacent to Whitaker and Williamstown soils on the landscape. Whitaker soils have less sand in the upper part of the subsoil than the Aubbeenaubbee soils. They are in the lower positions on the landscape. Williamstown soils are browner in the upper part of the solum than the Aubbeenaubbee soils. They are in the more sloping areas.

Typical pedon of Aubbeenaubbee fine sandy loam, in an area of Aubbeenaubbee-Whitaker complex, 0 to 2 percent slopes, in a cultivated field; 1,640 feet west and 430 feet south of the northeast corner of sec. 36, T. 28 N., R. 10 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) fine sandy loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; very friable; common fine roots; neutral; abrupt smooth boundary.

E—9 to 17 inches; brown (10YR 5/3) fine sandy loam; common medium distinct gray (10YR 5/1) mottles; weak medium subangular blocky structure; friable; few fine roots; slightly acid; clear wavy boundary.

Btg1—17 to 26 inches; grayish brown (10YR 5/2) fine sandy loam; few medium distinct brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; friable; thin continuous dark gray (10YR 4/1) clay films on faces of peds; slightly acid; clear wavy boundary.

2Btg2—26 to 43 inches; grayish brown (10YR 5/2) clay loam; common medium distinct brownish yellow (10YR 6/8) mottles; weak coarse subangular blocky structure; firm; thin continuous gray (10YR 5/1) clay films on faces of peds; neutral; gradual wavy boundary.

2Cd—43 to 60 inches; brown (10YR 5/3) loam; common medium distinct brownish yellow (10YR 6/8) mottles; massive; very firm; many white (N 8/0) accumulations of calcium carbonate; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches. The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 1 to 4. It is strongly acid to slightly acid. The 2Bt horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 6. It is clay loam or loam. The 2Cd horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 to 6. It is mildly alkaline or moderately alkaline.

Ayr Series

The Ayr series consists of very deep, well drained soils on recessional ground moraines. These soils formed in sandy sediments and glacial till. Permeability is rapid in the upper part of the solum and moderate in the lower part of the solum and in the substratum. Slopes range from 1 to 6 percent.

Ayr soils are similar to Ayrmount and Simonin soils and are adjacent to Octagon, Ridgeville, and Sparta soils on the landscape. Ayrmount soils have more clay in the lower part of the subsoil than the Ayr soils, and Simonin soils have more clay in the lower part of the solum. Octagon soils have more clay and less sand in the upper part of the solum than the Ayr soils. Also, they are in the higher positions on the landscape. Ridgeville soils are more gray in the upper part of the subsoil than the Ayr soils and have more clay in the upper part of the solum. They are lower on the landscape than the Ayr soils. Sparta soils have less clay and more sand in the lower part of the solum than the Ayr soils. They are in landscape positions similar to those of the Ayr soils.

Typical pedon of Ayr loamy fine sand, 1 to 4 percent slopes, in a cultivated field; 700 feet west and 200 feet north of the center of sec. 19, T. 29 N., R. 8 W.

Ap—0 to 10 inches; very dark brown (10YR 2/2) loamy fine sand, dark grayish brown (10YR 4/2) dry; weak fine granular structure; very friable; common fine roots; neutral; abrupt smooth boundary.

A—10 to 15 inches; very dark brown (10YR 2/2) loamy fine sand, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; very friable; few fine roots; slightly acid; clear wavy boundary.

Bw—15 to 28 inches; dark yellowish brown (10YR 4/4) loamy fine sand; weak fine subangular blocky structure; very friable; few fine roots; slightly acid; clear wavy boundary.

Bt1—28 to 35 inches; yellowish brown (10YR 5/4) loamy sand; weak medium subangular blocky structure; very friable; thin dark yellowish brown (10YR 4/4) clay bridges between sand grains; neutral; clear smooth boundary.

2Bt2—35 to 40 inches; yellowish brown (10YR 5/4) loam; moderate medium subangular blocky structure; friable; thin discontinuous dark yellowish brown (10YR 4/6) clay films on faces of peds; neutral; clear wavy boundary.

2C—40 to 60 inches; yellowish brown (10YR 5/4) loam;

massive; friable; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 40 inches. The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. The Bw and Bt horizons have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. They are loamy sand, loamy fine sand, sand, or fine sand. They are slightly acid or neutral. The 2Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. It ranges from slightly acid to mildly alkaline. The 2C horizon has hue of 10YR, value of 5, and chroma of 3 or 4. It is mildly alkaline or moderately alkaline.

Ayrmount Series

The Ayrmount series consists of very deep, moderately well drained soils on recessional moraines. These soils formed in sandy sediments and glacial till. Permeability is rapid in the upper part of the solum and moderate in the lower part of the solum and in the substratum. Slopes range from 0 to 2 percent.

Ayrmount soils are similar to Ayr and Simonin soils and are adjacent to Nesius and Ridgeville soils on the landscape. Ayr soils have less clay in the lower part of the subsoil than the Ayrmount soils, and Simonin soils have more clay in the lower part of the solum. Nesius soils have more sand and less clay in the lower part of the solum than the Ayrmount soils. They are in the higher positions on the landscape. Ridgeville soils have more gray in the upper part of the subsoil than the Ayrmount soils and have more clay in the upper part of the solum. They are lower on the landscape than the Ayrmount soils.

Typical pedon of Ayrmount loamy fine sand, 0 to 2 percent slopes, in a cultivated field; 800 feet east and 2,200 feet north of the southwest corner of sec. 23, T. 29 N., R. 9 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loamy fine sand, grayish brown (10YR 5/2) dry; weak medium granular structure; very friable; common fine roots; neutral; abrupt smooth boundary.

A—8 to 13 inches; dark brown (10YR 3/3) loamy fine sand, brown (10YR 5/3) dry; weak medium granular structure; very friable; few fine roots; medium acid; clear wavy boundary.

E—13 to 27 inches; dark yellowish brown (10YR 4/4) fine sand; weak fine subangular blocky structure; very friable; few fine roots; slightly acid; clear wavy boundary.

Bt1—27 to 30 inches; dark yellowish brown (10YR 4/4) loamy fine sand; weak fine subangular blocky structure; very friable; thin dark brown (7.5YR 4/4) clay bridges between sand grains; slightly acid; clear wavy boundary.

Bt2—30 to 33 inches; yellowish brown (10YR 5/4) sandy clay loam; moderate medium subangular blocky structure; friable; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; slightly acid; clear smooth boundary.

2Bt3—33 to 44 inches; yellowish brown (10YR 5/4) loam; common fine distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; 3 percent gravel; neutral; clear wavy boundary.

2C—44 to 60 inches; yellowish brown (10YR 5/4) loam; common fine distinct grayish brown (10YR 5/2) mottles; massive; friable; 3 percent gravel; slight effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 50 inches. The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. The E horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is loamy sand, loamy fine sand, sand, or fine sand. It is medium acid or slightly acid. The Bt2 horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is medium acid or slightly acid. The 2Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. It is neutral or mildly alkaline. The 2C horizon has hue of 10YR, value of 5, and chroma of 3 or 4. It is mildly alkaline or moderately alkaline.

Barce Series

The Barce series consists of very deep, moderately well drained soils on ground moraines. These soils formed in loamy outwash and glacial till. Permeability is moderate in the upper part of the solum, moderately slow in the lower part of the solum, and slow in the substratum. Slopes range from 0 to 4 percent.

Barce soils are adjacent to Corwin, Gilboa, Montmorenci, and Selma soils on the landscape. Corwin and Montmorenci soils have less sand in the upper part of the subsoil than the Barce soils. They are in the more sloping areas. Gilboa and Selma soils are grayer in the upper part of the subsoil than the Barce soils. They are in the lower lying areas.

Typical pedon of Barce loam, in an area of Barce-Montmorenci complex, 1 to 4 percent slopes, eroded, in a cultivated field; 1,600 feet north and 550 feet east of the southwest corner of sec. 23, T. 27 N., R. 9 W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; mixed

with yellowish brown (10YR 5/4) clay loam from the subsoil; weak medium granular structure; friable; common fine and very fine roots; 5 percent gravel; neutral; abrupt smooth boundary.

Bt1—10 to 26 inches; yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; friable; common fine and very fine roots; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; 5 percent gravel; slightly acid; gradual wavy boundary.

Bt2—26 to 42 inches; yellowish brown (10YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable; few very fine roots; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; 5 percent gravel; slightly acid; clear wavy boundary.

2Bt3—42 to 48 inches; light olive brown (2.5Y 5/4) loam; common fine distinct light brownish gray (2.5Y 6/2) mottles; weak coarse subangular blocky structure; firm; few very fine roots; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; 3 percent gravel; neutral; clear wavy boundary.

2Cd—48 to 60 inches; light olive brown (2.5Y 5/4) loam; massive; very firm; 3 percent gravel; few fine accumulations of calcium carbonate; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches. The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. It is loam or silt loam. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is loam, clay loam, or sandy clay loam. The content of gravel in this horizon ranges from 0 to 12 percent by volume. The Bt horizon ranges from strongly acid to neutral. The 2Bt horizon has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 3 or 4. The content of gravel in this horizon ranges from 0 to 10 percent by volume. The 2Bt horizon is neutral or mildly alkaline. The 2Cd horizon has hue of 2.5Y or 10YR, value of 5, and chroma of 3 or 4. The content of gravel in this horizon ranges from 0 to 10 percent by volume. The 2Cd horizon is mildly alkaline or moderately alkaline.

Barry Series

The Barry series consists of very deep, poorly drained soils on moraines. These soils formed in glacial till. Permeability is moderate in the solum and slow in the substratum. Slopes range from 0 to 2 percent.

Barry soils are similar to Gilford, Granby, Maumee, and Zadog soils and are adjacent to Octagon and Sumava soils on the landscape. Gilford, Granby, and Maumee soils have less clay in the solum than the Barry soils. They are in the slightly higher positions on the landscape. Zadog soils have iron nodules in the profile. Octagon soils are browner throughout than the Barry soils. They are in the higher positions on the landscape. Sumava soils have less clay in the subsoil than the Barry soils and are browner in the upper part of the subsoil. They are in the slightly higher positions on the landscape.

Typical pedon of Barry fine sandy loam, in an area of Barry-Gilford complex, in a cultivated field; 1,400 feet west and 75 feet north of the southeast corner of sec. 13, T. 29 N., R. 9 W.

Ap—0 to 12 inches; very dark gray (10YR 3/1) fine sandy loam, gray (10YR 5/1) dry; moderate medium subangular blocky structure parting to weak medium granular; friable; common fine and medium roots; neutral; abrupt smooth boundary.

Btg1—12 to 22 inches; dark gray (10YR 4/1) loam; common fine distinct dark brown (10YR 4/3) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; common fine and medium roots; thin continuous very dark gray (10YR 3/1) clay films on faces of prisms and peds; neutral; clear smooth boundary.

Btg2—22 to 36 inches; gray (10YR 5/1) loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; thin continuous dark gray (10YR 4/1) clay films on faces of prisms and peds; common very dark gray (10YR 3/1) krotovinas; neutral; gradual wavy boundary.

Btg3—36 to 47 inches; gray (10YR 6/1) loam; many medium distinct yellowish brown (10YR 5/8) mottles; weak coarse prismatic structure parting to weak medium subangular blocky; firm; thin discontinuous gray (10YR 5/1) clay films on faces of prisms and peds; common very dark gray (10YR 3/1) krotovinas; mildly alkaline; gradual wavy boundary.

Cg—47 to 60 inches; grayish brown (2.5Y 5/2) loam; many medium distinct yellowish brown (10YR 5/8) mottles; massive; friable; slight effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 50 inches. The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is fine sandy loam or loam. The Btg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is loam, sandy clay loam, or fine sandy loam. It is slightly acid or neutral in the upper part and neutral or mildly alkaline in the lower part. The C horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 to 3. It is mildly alkaline or moderately alkaline and contains free calcium carbonates.

Brems Series

The Brems series consists of very deep, moderately well drained, rapidly permeable soils on outwash plains. These soils formed in sandy sediments. Slopes range from 1 to 3 percent.

Brems soils are similar to Nesius soils and are adjacent to Maumee, Morocco, Newton, Oakville, and Seafield soils on the landscape. Nesius soils have a thicker, darker surface soil than the Brems soils. Morocco and Seafield soils are grayer in the upper part of the subsoil than the Brems soils. They are in the lower positions on the landscape. Oakville soils do not have gray mottles in the subsoil. They are in the higher landscape positions. Maumee and Newton soils have a thicker, darker surface soil than the Brems soils and are more gray throughout the profile. They are in the lower positions on the landscape.

Typical pedon of Brems loamy sand, 1 to 3 percent slopes, in a cultivated field; 2,200 feet west and 2,100 feet north of the southeast corner of sec. 14, T. 31 N., R. 9 W.

Ap—0 to 7 inches; dark brown (10YR 4/3) loamy sand, pale brown (10YR 6/3) dry; weak fine granular structure; very friable; common fine roots; strongly acid; abrupt smooth boundary.

Bw1—7 to 15 inches; dark brown (7.5YR 4/4) loamy fine sand; weak fine granular structure; very friable; few fine roots; strongly acid; clear wavy boundary.

Bw2—15 to 26 inches; yellowish brown (10YR 5/4) loamy sand; weak fine granular structure; very friable; strongly acid; clear wavy boundary.

Bw3—26 to 36 inches; yellowish brown (10YR 5/4) sand; common medium distinct strong brown (7.5YR 5/6) and few fine distinct light brownish gray (10YR 6/2) mottles; weak medium granular structure; very friable; strongly acid; clear wavy boundary.

C1—36 to 41 inches; yellowish brown (10YR 5/6) sand; single grain; loose; few pockets of light brownish gray (10YR 6/2), stripped sand grains; strongly acid; clear wavy boundary.

C2—41 to 60 inches; yellowish brown (10YR 5/6) sand; common medium prominent yellowish red (5YR 5/6) mottles; single grain; loose; few pockets of light brownish gray (10YR 6/2), stripped sand grains; strongly acid.

The thickness of the solum ranges from 35 to 60 inches. The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. It is loamy sand, loamy fine sand, fine sand, or sand. The Bw horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 8. It is loamy sand, loamy fine sand, fine sand, or sand. It is very strongly acid to medium acid. The C horizon has hue of 10YR, value of 5 to 7, and chroma of 2 to 6. It is sand or fine sand. It is strongly acid to slightly acid.

Bryce Series

The Bryce series consists of very deep, poorly drained soils on recessional moraines. These soils formed in water-sorted deposits and in the underlying glacial till. Permeability is slow in the upper part of the solum and slow or very slow in the lower part of the solum and in the substratum. Slopes range from 0 to 2 percent.

Bryce soils are adjacent to Papineau, Simonin, Swygert, and Swygert Variant soils on the landscape. Simonin soils have less clay in the upper part of the solum than the Bryce soils. Simonin and Swygert Variant soils are browner in the subsoil than the Bryce soils. They are in the higher positions on the landscape. Papineau and Swygert soils are less gray in the upper part of the subsoil than the Bryce soils. They are on low rises.

Typical pedon of Bryce silty clay loam, in a cultivated field; 1,600 feet west and 1,300 feet north of the southeast corner of sec. 31, T. 29 N., R. 8 W.

Ap—0 to 10 inches; black (N 2/0) silty clay loam, very dark grayish brown (10YR 3/2) dry; weak medium granular structure; friable; many fine and very fine roots; neutral; abrupt smooth boundary.

A—10 to 16 inches; black (10YR 2/1) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate medium angular blocky structure; friable; few very fine roots; neutral; clear wavy boundary.

Btg1—16 to 31 inches; dark gray (N 4/0) silty clay; few fine distinct olive gray (5Y 5/2) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; few very fine roots; thin continuous dark grayish brown (2.5Y 4/2) clay films on faces of prisms and peds; neutral; gradual wavy boundary.

Btg2—31 to 40 inches; gray (N 5/0) silty clay; common medium distinct olive (5Y 5/3) mottles; strong medium prismatic structure parting to moderate medium angular blocky; firm; thin continuous grayish brown (2.5Y 5/2) clay films on faces of prisms and peds; neutral; clear wavy boundary.

2Btg3—40 to 53 inches; grayish brown (2.5Y 5/2) silty clay; common medium distinct light olive brown (2.5Y 5/6) mottles; moderate medium angular blocky structure; very firm; thin discontinuous light brownish gray (2.5Y 6/2) clay films on faces of peds; mildly alkaline; gradual wavy boundary.

2Cdg—53 to 60 inches; light brownish gray (2.5Y 6/2) silty clay; common medium distinct light olive brown

(2.5Y 5/6) mottles; massive; very firm; common white (10YR 8/1) accumulations of calcium carbonate; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 45 to 55 inches. The thickness of the water-sorted deposits ranges from 35 to 50 inches. The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1, or it is neutral in hue and has value of 2 or 3. It is silty clay loam or silty clay. The Btg horizon has hue of 2.5Y or 5Y, value of 2 to 6, and chroma of 1 to 3, or it is neutral in hue and has value of 2 to 6. Value of 2 or 3 is limited to the upper few inches of the horizon. The Btg horizon ranges from neutral to moderately alkaline. The 2Btg horizon has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 1 or 2. It is silty clay loam or silty clay. It is mildly alkaline or moderately alkaline. The 2Cdg horizon has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 1 to 4. It is silty clay loam or silty clay. It is mildly alkaline or moderately alkaline.

Comfrey Series

The Comfrey series consists of very deep, very poorly drained, moderately permeable soils on flood plains. These soils formed in loamy alluvium. Slopes range from 0 to 2 percent.

Comfrey soils are similar to Craigmile, Prochaska, and Sawabash soils and are adjacent to Miami soils on the landscape. Craigmile soils have less clay in the profile than the Comfrey soils, and Sawabash soils have more silt and less sand in the solum. Miami soils are browner throughout than the Comfrey soils. They are in the higher positions on the landscape.

Typical pedon of Comfrey loam, frequently flooded, undrained, in a pasture; 1,320 feet west and 1,320 feet south of the northeast corner of sec. 13, T. 27 N., R. 10 W.

A1—0 to 17 inches; very dark gray (10YR 3/1) loam, gray (10YR 5/1) dry; moderate medium granular structure; friable; many very fine roots; neutral; clear wavy boundary.

A2—17 to 31 inches; black (10YR 2/1) loam, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure; friable; many very fine roots; neutral; clear wavy boundary.

Bg—31 to 44 inches; gray (10YR 5/1) loam; common medium distinct yellowish brown (10YR 5/4) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; common very fine roots; thin discontinuous very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear wavy boundary.

Cg—44 to 60 inches; gray (10YR 5/1) loam; common medium distinct light olive brown (2.5Y 5/6) mottles; massive; friable; slight effervescence; mildly alkaline.

The thickness of the solum ranges from 40 to 55 inches. The thickness of the mollic epipedon ranges from 24 to 36 inches. The A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2 or 3. It is loam or silt loam. The content of gravel ranges from 0 to 5 percent by volume. The Bg horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. It is loam or clay loam. The content of gravel ranges from 0 to 5 percent by volume. This horizon is neutral or mildly alkaline. The Cg horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. It is loam or clay loam. The content of gravel ranges from 0 to 10 percent. This horizon is neutral to moderately alkaline.

Conrad Series

The Conrad series consists of very deep, very poorly drained, rapidly permeable soils on old lake beds on outwash plains. These soils formed in sandy sediments. Slopes are 0 to 1 percent.

Conrad soils are similar to Kentland soils and are adjacent to Tedrow and Zaborosky soils on the landscape. Kentland soils have a thicker dark surface soil than the Conrad soils. Tedrow and Zaborosky soils are browner in the upper part of the subsoil than the Conrad soils. Also, they are slightly higher on the landscape.

Typical pedon of Conrad loamy fine sand, in a cultivated field; 700 feet east and 300 feet north of the southwest corner of sec. 14, T. 30 N., R. 9 W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) loamy fine sand, gray (10YR 5/1) dry; weak fine granular structure; very friable; many fine and very fine roots; slightly acid; abrupt smooth boundary.

Cg1—8 to 17 inches; light brownish gray (10YR 6/2) fine sand; few fine distinct dark yellowish brown (10YR 4/4) mottles; single grain; loose; common fine and very fine roots; neutral; clear wavy boundary.

Cg2—17 to 25 inches; light brownish gray (10YR 6/2) fine sand; common medium distinct dark yellowish brown (10YR 4/6) mottles; single grain; loose; few fine and very fine roots; neutral; gradual wavy boundary.

C1—25 to 42 inches; light yellowish brown (10YR 6/4) fine sand; few fine distinct light brownish gray (10YR 6/2) mottles; single grain; loose; slight

effervescence; mildly alkaline; gradual wavy boundary.

C2—42 to 49 inches; pale brown (10YR 6/3) sand; single grain; loose; strong effervescence; moderately alkaline; gradual wavy boundary.

C3—49 to 60 inches; brown (10YR 5/3) sand; single grain; loose; strong effervescence; moderately alkaline.

The depth to free carbonates ranges from 20 to 40 inches. The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is neutral or slightly acid. The Cg horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. It is neutral or slightly acid. The C horizon has hue of 10YR, value of 4 to 7, and chroma of 2 to 8. The higher chroma coincides with the presence of carbonates.

Corwin Series

The Corwin series consists of very deep, moderately well drained, moderately permeable soils on recessional moraines and ground moraines. These soils formed in glacial till. Slopes range from 0 to 6 percent.

Corwin soils are similar to Montmorenci and Octagon soils and are adjacent to Barce and Odell soils on the landscape. Montmorenci soils have a thinner dark surface soil than the Corwin soils. Octagon soils do not have gray mottles in the solum. Barce soils have more sand in the upper part of the subsoil than the Corwin soils. Also, they are in less sloping areas. Odell soils are grayer in the upper part of the subsoil than the Corwin soils. They are in the slightly lower lying areas.

Typical pedon of Corwin fine sandy loam, 0 to 2 percent slopes, in a cultivated field; 900 feet west and 1,600 feet south of the center of sec. 10, T. 29 N., R. 8 W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) fine sandy loam, gray (10YR 5/1) dry; weak fine granular structure; very friable; common fine roots; slightly acid; abrupt smooth boundary.

A—8 to 12 inches; very dark grayish brown (10YR 3/2) fine sandy loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure; friable; common fine roots; slightly acid; clear wavy boundary.

Bt1—12 to 16 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium subangular blocky structure; friable; 2 percent gravel; few fine roots; thin discontinuous dark brown (10YR 4/3) clay films on faces of peds; slightly acid; clear wavy boundary.

Bt2—16 to 28 inches; yellowish brown (10YR 5/6) clay loam; moderate medium subangular blocky structure; friable; 2 percent gravel; few fine roots; thin discontinuous yellowish brown (10YR 5/4) clay films on faces of peds; neutral; gradual wavy boundary.

Bt3—28 to 35 inches; yellowish brown (10YR 5/6) clay loam; common medium distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; friable; 2 percent gravel; thin discontinuous yellowish brown (10YR 5/4) clay films on faces of peds; neutral; clear wavy boundary.

BC—35 to 40 inches; brown (10YR 5/3) loam; common medium faint grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; friable; 2 percent gravel; slight effervescence; mildly alkaline; clear wavy boundary.

C—40 to 60 inches; brown (10YR 5/3) loam; common medium distinct light brownish gray (10YR 6/2) mottles; massive; friable; 2 percent gravel; common light gray (10YR 7/1) accumulations of calcium carbonate; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 40 inches. The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. It is fine sandy loam, loam, or silt loam. The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. It is mainly loam or clay loam, but the range includes silty clay loam in the upper part. This horizon is strongly acid to slightly acid in the upper part and medium acid to neutral in the lower part. The C horizon has hue of 10YR or 2.5YR, value of 4 or 5, and chroma of 3 or 4. It is loam or silt loam. It is mildly alkaline or moderately alkaline.

Craigmile Series

The Craigmile series consists of very deep, very poorly drained soils on flood plains. These soils formed in alluvium consisting of loamy sediments over sandy deposits. Permeability is moderately rapid in the loamy material and rapid in the sandy material. Slopes range from 0 to 2 percent.

The Craigmile soils in this survey area have more fine or coarser sand in the loamy material than is defined as the range for the series. This difference, however, does not affect the use or management of these soils.

Craigmile soils are similar to Comfrey, Prochaska, and Sawabash soils and are adjacent to Algansee soils on the landscape. Comfrey and Sawabash soils have more clay in the profile than the Craigmile soils, and Prochaska soils have less clay in the upper part of the profile. Algansee soils are browner in the upper part of the subsoil than the Craigmile soils. They are in the slightly higher positions on the landscape.

Typical pedon of Craigmile mucky silt loam,

frequently flooded, undrained, in a wooded area; 3,600 feet north and 2,400 feet east of the southwest corner of sec. 4, T. 31 N., R. 9 W.

A1—0 to 5 inches; very dark brown (10YR 2/2) mucky silt loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; many fine roots; neutral; clear wavy boundary.

A2—5 to 10 inches; very dark gray (10YR 3/1) loam, gray (10YR 5/1) dry; weak medium subangular blocky structure parting to moderate medium granular; friable; many fine and medium roots; neutral; clear wavy boundary.

Cg1—10 to 17 inches; dark gray (10YR 4/1) fine sandy loam; few fine distinct brown (10YR 5/3) mottles; moderate medium subangular blocky structure; friable; common fine roots; common strata of very dark brown (10YR 2/2) and very dark grayish brown (10YR 3/2) loam totaling 2 inches; mildly alkaline; clear wavy boundary.

Cg2—17 to 23 inches; dark gray (10YR 4/1) fine sandy loam; many medium distinct brown (10YR 4/3) mottles; weak medium subangular blocky structure; friable; few fine roots; common strata of dark brown (10YR 3/3) sandy loam totaling 2 inches; slight effervescence; mildly alkaline; clear wavy boundary.

C—23 to 30 inches; dark yellowish brown (10YR 4/4) loamy fine sand; many medium distinct gray (10YR 5/1) and common medium faint dark yellowish brown (10YR 4/6) mottles; single grain; loose; slight effervescence; mildly alkaline; clear wavy boundary.

C'g—30 to 34 inches; dark gray (10YR 4/1) fine sand; many medium distinct yellowish brown (10YR 5/6) mottles; single grain; loose; slight effervescence; moderately alkaline; clear wavy boundary.

C'1—34 to 40 inches; brown (10YR 5/3) fine sand; many medium faint grayish brown (10YR 5/2) mottles; single grain; loose; slight effervescence; moderately alkaline; clear wavy boundary.

C'2—40 to 60 inches; strong brown (7.5YR 5/6) sand; single grain; loose; slight effervescence; moderately alkaline.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is loam, loamy sand, sandy loam, or mucky silt loam. It is medium acid to neutral. The upper part of the C horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 1 to 3. The lower part has chroma of 1 to 6. This horizon is sandy loam, fine sandy loam, or loam in the upper part and loamy fine sand, loamy sand, sand, or fine sand in the lower part. It is slightly acid or neutral in the upper part and neutral or mildly alkaline in the lower part.

Darroch Series

The Darroch series consists of very deep, somewhat poorly drained soils on outwash plains, recessional moraines, and ground moraines. These soils formed in silty and loamy sediments. Permeability typically is moderately slow. In the sandy substratum phase, however, permeability is moderate in the solum and rapid in the substratum. Slopes range from 0 to 2 percent.

Darroch soils are similar to Gilboa soils and are adjacent to Elston Variant, Foresman, Glenhall, and Selma soils on the landscape. Gilboa soils have more clay and less sand in the substratum than the Darroch soils, and Elston Variant soils have less clay in the subsoil. Elston Variant, Foresman, and Glenhall soils are browner in the upper part of the subsoil than the Darroch soils. They are in the higher positions on the landscape. Selma soils are grayer in the upper part of the subsoil than the Darroch soils. They are in the lower landscape positions.

Typical pedon of Darroch silt loam, 0 to 2 percent slopes, in a cultivated field; 50 feet north and 800 feet west of the center of sec. 32, T. 28 N., R. 9 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak medium granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

A—8 to 12 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak fine subangular blocky structure; friable; common very fine roots; slightly acid; clear wavy boundary.

Bt1—12 to 16 inches; dark brown (10YR 4/3) silty clay loam; many medium distinct grayish brown (10YR 5/2) mottles; moderate fine subangular blocky structure; friable; few very fine roots; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; medium acid; clear wavy boundary.

2Bt2—16 to 26 inches; yellowish brown (10YR 5/4) clay loam; many medium distinct light brownish gray (10YR 6/2) and few fine distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; medium acid; clear wavy boundary.

2Bt3—26 to 32 inches; yellowish brown (10YR 5/4) loam; common medium distinct light brownish gray (10YR 6/2) and common fine distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; thin discontinuous grayish brown (10YR 5/2) clay films

on faces of peds; slightly acid; gradual wavy boundary.

2C—32 to 60 inches; light yellowish brown (10YR 6/4) silt loam; many medium distinct grayish brown (10YR 5/2) mottles; massive; friable; thin strata of fine sand and fine sandy loam totaling 10 inches; slight effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 40 inches. The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. It is loam, fine sandy loam, or silt loam. The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4. It is silty clay loam or clay loam in the upper part and loam, sandy clay loam, or clay loam in the lower part. It is medium acid to neutral. The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. It is loam or silt loam but has strata of finer and coarser textured material. It is mildly alkaline or moderately alkaline.

Elston Variant

The Elston Variant consists of very deep, moderately well drained soils on outwash plains and moraines. These soils formed in loamy and sandy sediments. Permeability is moderately rapid in the upper part of the solum and rapid in the lower part of the solum and in the substratum. Slopes range from 1 to 3 percent.

Elston Variant soils are similar to Onarga and Ormas soils and are adjacent to Darroch soils on the landscape. Onarga soils have more clay in the lower part of the subsoil than the Elston Variant soils and are stratified in the substratum. Ormas soils have more sand in the upper part of the solum than the Elston Variant soils and have a light colored surface layer. Darroch soils have more clay than the Elston Variant soils and are grayer in the upper part of the subsoil. They are in the lower positions on the landscape.

Typical pedon of Elston Variant fine sandy loam, 1 to 3 percent slopes, in a cultivated field; 1,000 feet west and 150 feet north of the southeast corner of sec. 33, T. 29 N., R. 8 W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) fine sandy loam, grayish brown (10YR 5/2) dry; weak medium granular structure; friable; many fine roots; medium acid; abrupt smooth boundary.

Bt1—10 to 16 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; common fine roots; thin discontinuous brown (10YR 4/3) clay films on faces of peds; medium acid; clear wavy boundary.

Bt2—16 to 27 inches; yellowish brown (10YR 5/4) fine sandy loam; moderate medium subangular blocky structure; friable; few fine roots; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; medium acid; clear wavy boundary.

2Bt3—27 to 35 inches; strong brown (7.5YR 5/6) loamy sand; common medium distinct yellowish red (5YR 4/6) mottles; moderate medium subangular blocky structure; friable; few very fine roots; 5 percent gravel; thin dark yellowish brown (10YR 4/4) clay bridges between sand grains; medium acid; clear wavy boundary.

2BC—35 to 41 inches; yellowish brown (10YR 5/6) loamy sand; many coarse distinct gray (10YR 5/1) mottles; weak coarse subangular blocky structure; very friable; 10 percent gravel; slightly acid; clear wavy boundary.

2C1—41 to 45 inches; strong brown (7.5YR 5/6) sand; many coarse distinct grayish brown (10YR 5/2) mottles; single grain; loose; 12 percent gravel; slight effervescence; mildly alkaline; gradual wavy boundary.

2C2—45 to 60 inches; yellowish brown (10YR 5/4) sand; common medium distinct gray (10YR 5/1) and dark brown (7.5YR 4/4) mottles; single grain; loose; 12 percent gravel; slight effervescence; mildly alkaline.

The thickness of the solum ranges from 40 to 60 inches. The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. It is medium acid to neutral. The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is medium acid or slightly acid. The 2Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is medium acid to neutral. The 2C horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 6. It is mildly alkaline or moderately alkaline.

Foresman Series

The Foresman series consists of very deep, moderately well drained soils on ground moraines, recessional moraines, and outwash plains. These soils formed in loamy outwash sediments. Permeability typically is moderate in the solum and moderately slow in the substratum. In the till substratum phase, however, it is moderate or is moderate in the solum and moderately slow or slow in the substratum. In the moderately fine substratum phase, permeability is moderate in the solum, moderately slow in the upper part of the substratum, and moderately slow or slow in the lower part. Slopes range from 0 to 6 percent.

Foresman soils are similar to Glenhall, Martinsville, and Miami soils and are adjacent to Darroch and Selma soils on the landscape. Glenhall soils have a thinner surface layer than the Foresman soils, and Martinsville and Miami soils have a lighter colored surface layer.

Darroch soils are grayer in the upper part of the subsoil than the Foresman soils. They are in the slightly lower lying areas. Selma soils are grayer in the upper part of the subsoil than the Foresman soils. They are in the lowest positions on the landscape.

Typical pedon of Foresman silt loam, 0 to 2 percent slopes, in a cultivated field; 800 feet east and 25 feet south of the northwest corner of sec. 3, T. 27 N., R. 8 W.

Ap—0 to 10 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak medium granular structure; friable; common medium roots; neutral; abrupt smooth boundary.

Bt1—10 to 17 inches; yellowish brown (10YR 5/4) clay loam; weak medium subangular blocky structure; firm; common fine roots; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; common very dark gray (10YR 3/1) root channels; neutral; clear wavy boundary.

Bt2—17 to 28 inches; yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; firm; common fine roots; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; neutral; clear wavy boundary.

Bt3—28 to 34 inches; yellowish brown (10YR 5/4) clay loam; few medium distinct brownish yellow (10YR 6/6) and common medium distinct gray (10YR 5/1) mottles; moderate medium subangular blocky structure; firm; thin discontinuous grayish brown (10YR 5/2) clay films on faces of peds; neutral; clear wavy boundary.

C—34 to 60 inches; brown (10YR 5/3) silt loam; many coarse faint grayish brown (10YR 5/2) and common medium distinct brownish yellow (10YR 6/6) mottles; massive; friable; thin strata of loamy very fine sand totaling 10 inches; thin discontinuous light gray (10YR 7/1) calcium carbonate flows between faces of peds; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 40 inches. The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. It is fine sandy loam or silt loam. The Bt horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. The upper part is typically clay loam or sandy clay loam, but the range includes silty clay loam. Reaction in this part of the Bt horizon is strongly acid to neutral. The lower part of the Bt horizon is clay loam, loam, or sandy clay loam. It is medium acid to neutral. The C horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 or 4. It is loam or silt loam but has strata of coarser textured material. It is mildly alkaline or moderately alkaline.

Gilboa Series

The Gilboa series consists of very deep, somewhat poorly drained soils on ground moraines. These soils formed in silty material, in loamy outwash, and in the underlying glacial till. Permeability is moderate in the upper part of the solum, moderately slow in the lower part of the solum, and slow or very slow in the substratum. Slopes range from 0 to 2 percent.

Gilboa soils are similar to Darroch soils and are adjacent to Barce and Odell soils on the landscape. Darroch soils have less clay and more sand in the substratum than the Gilboa soils. Barce soils are browner in the upper part of the subsoil than the Gilboa soils. They are in the higher lying areas. Odell soils have less sand in the upper part of the subsoil than the Gilboa soils. They are in the higher positions on the landscape.

Typical pedon of Gilboa silt loam, in an area of Gilboa-Odell complex, 0 to 2 percent slopes, in a cultivated field; 700 feet west and 1,000 feet north of the center of sec. 36, T. 27 N., R. 8 W.

Ap 0 to 10 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; moderate medium granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

Bt1—10 to 18 inches; brown (10YR 5/3) silty clay loam; common fine distinct dark grayish brown (2.5Y 4/2) mottles; moderate medium subangular blocky structure; friable; few very fine roots; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; medium acid; gradual wavy boundary.

2Bt2—18 to 41 inches; dark brown (10YR 4/3) clay loam; common fine distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; friable; few very fine roots; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; 5 percent gravel; medium acid; clear wavy boundary.

3Btg—41 to 50 inches; grayish brown (2.5Y 5/2) loam; common fine distinct yellowish brown (10YR 5/4) mottles; weak coarse subangular blocky structure; firm; few very fine roots; thin discontinuous grayish brown (2.5Y 5/2) clay films on faces of peds; 3 percent gravel; neutral; clear wavy boundary.

3Cdg—50 to 60 inches; grayish brown (2.5Y 5/2) loam; massive; very firm; common light gray (10YR 7/1) accumulations of calcium carbonate; 3 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches. The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The Bt and 2Bt horizons have

hue of 10YR, value of 4 or 5, and chroma of 2 to 6. They are medium acid to neutral. The 2Bt horizon is loam or clay loam. The content of gravel ranges from 0 to 10 percent by volume. The 3Bt horizon has hue of 2.5Y or 10YR, value of 5 or 6, and chroma of 2 to 4. The content of gravel ranges from 0 to 10 percent by volume. This horizon is neutral or mildly alkaline. The 3Cd horizon has hue of 2.5Y or 10YR, value of 5 or 6, and chroma of 1 to 6. The content of gravel ranges from 0 to 10 percent by volume. This horizon is mildly alkaline or moderately alkaline.

Gilford Series

The Gilford series consists of very deep, very poorly drained soils on outwash plains, lake plains, and recessional moraines. These soils formed in sandy and loamy sediments. Permeability is moderately rapid in the solum and rapid in the substratum. Slopes range from 0 to 2 percent.

Gilford soils are similar to Barry, Granby, Maumee, and Zadog soils and are adjacent to Ridgeville, Seafield, and Wallkill Variant soils on the landscape. Granby and Maumee soils have more sand and less clay in the control section than the Gilford soils. Zadog soils have iron nodules in the solum. Barry soils have more clay in the solum than the Gilford soils. Also, they are in lower positions on the landscape. Ridgeville and Seafield soils are browner in the upper part of the subsoil than the Gilford soils. They are in the slightly higher landscape positions. Wallkill Variant soils have more clay in the solum than the Gilford soils and have muck in the profile. They are in the lower lying positions on the landscape.

Typical pedon of Gilford fine sandy loam, in a cultivated field; 850 feet south and 1,120 feet west of the center of sec. 24, T. 30 N., R. 9 W.

Ap—0 to 9 inches; black (10YR 2/1) fine sandy loam, gray (10YR 5/1) dry; weak fine granular structure; very friable; many fine roots; medium acid; abrupt smooth boundary.

A—9 to 15 inches; black (10YR 2/1) fine sandy loam, gray (10YR 5/1) dry; weak medium granular structure; very friable; many fine roots; medium acid; clear wavy boundary.

BA—15 to 21 inches; very dark gray (10YR 3/1) fine sandy loam, grayish brown (10YR 5/2) dry; common fine distinct dark brown (7.5YR 3/4) mottles; weak medium subangular blocky structure; friable; common fine roots; slightly acid; clear wavy boundary.

Bg—21 to 34 inches; dark gray (10YR 4/1) fine sandy loam; few fine distinct olive (5Y 5/4) mottles; weak medium subangular blocky structure; friable; few fine roots; thin strata of light brownish gray (10YR 6/2) sand totaling 3 inches; common strong brown (7.5YR 5/6) iron accumulations; common black (10YR 2/1) krotovinas; medium acid; clear wavy boundary.

Cg—34 to 51 inches; light brownish gray (10YR 6/2) fine sand; common fine distinct yellowish brown (10YR 5/4) mottles; single grain; loose; neutral; clear wavy boundary.

C—51 to 60 inches; brown (10YR 5/3) fine sand; few fine faint grayish brown (10YR 5/2) mottles; single grain; loose; slight effervescence; mildly alkaline.

The thickness of the solum ranges from 30 to 40 inches. The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is fine sandy loam or sandy loam. The Bg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is sandy loam or fine sandy loam. It is medium acid to neutral. The C horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 to 3. It is fine sand, sand, or loamy sand. It is slightly acid or neutral in the upper part and neutral to moderately alkaline in the lower part.

Glenhall Series

The Glenhall series consists of very deep, moderately well drained soils on ground moraines, recessional moraines, and outwash plains. These soils formed in loamy glacial outwash. Permeability is moderate in the solum and moderately rapid in the substratum. Slopes range from 1 to 4 percent.

Glenhall soils are similar to Foresman, Martinsville, and Miami soils and are adjacent to Darroch and Ormas soils on the landscape. Foresman soils have a thicker surface layer than the Glenhall soils, and Martinsville and Miami soils have a lighter colored surface layer. Darroch soils are grayer in the upper part of the subsoil than the Glenhall soils. They are in the lower lying areas. Ormas soils have less clay and more sand in the solum than the Glenhall soils. They are in the slightly higher positions on the landscape.

Typical pedon of Glenhall loam, 1 to 4 percent slopes, in a cultivated field; 300 feet west and 1,700 feet north of the center of sec. 15, T. 27 N., R. 8 W.

Ap—0 to 9 inches; very dark brown (10YR 2/2) loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; many very fine roots; slightly acid; abrupt smooth boundary.

Bt1—9 to 18 inches; yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; friable; many very fine roots; thin discontinuous dark brown (10YR 4/3) clay films on faces of peds; slightly acid; clear wavy boundary.

Bt2—18 to 30 inches; yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; friable; common very fine roots; thin discontinuous dark brown (10YR 4/3) clay films on faces of peds; medium acid; clear wavy boundary.

Bt3—30 to 37 inches; yellowish brown (10YR 5/4) loam; common medium distinct grayish brown (10YR 5/2) mottles; moderate coarse subangular blocky structure; friable; few very fine roots; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; 5 percent gravel; slightly acid; clear wavy boundary.

2Bt4—37 to 49 inches; yellowish brown (10YR 5/6) gravelly sandy loam; common medium distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; very friable; thin dark yellowish brown (10YR 4/4) clay bridges between sand grains; 15 percent gravel; slightly acid; clear wavy boundary.

3C—49 to 60 inches; yellowish brown (10YR 5/4) sand; common medium distinct light brownish gray (10YR 6/2) and few medium distinct yellowish brown (10YR 5/8) mottles; single grain; loose; thin strata of loam totaling 3 inches; 10 percent gravel; slight effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches. The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is silt loam or loam. The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. It is clay loam, sandy clay loam, or loam. The content of gravel ranges from 0 to 12 percent by volume. The 2Bt horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 4 to 6. It is gravelly sandy loam or gravelly sandy clay loam. It is slightly acid or neutral. The content of gravel ranges from 15 to 25 percent by volume. The 3C horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. It is loamy sand, loamy fine sand, sand, or fine sand and has thin strata of silty and loamy material. It is mildly alkaline or moderately alkaline. The content of gravel is 3 to 15 percent by volume.

Granby Series

The Granby series consists of very deep, very poorly drained, rapidly permeable soils on outwash plains and lake plains. These soils formed in sandy sediments. Slopes range from 0 to 2 percent.

Granby soils are similar to Barry, Gilford, Maumee, and Zadog soils and are adjacent to Adrian and Morocco soils on the landscape. Barry and Gilford soils have more clay throughout than the Granby soils. They are in the lower positions on the landscape. Adrian soils have muck in the upper part of the profile. They are in the slightly lower positions. Maumee soils have a thicker dark surface soil than the Granby soils. Also, they are lower on the landscape. Zadog soils have iron nodules. Also, they have more clay in the solum than the Granby soils. They are in the lower positions on the landscape. Morocco soils are browner in the upper part of the subsoil than the Granby soils. They are in the slightly higher positions.

Typical pedon of Granby loamy fine sand, in a cultivated field; 800 feet east and 310 feet north of the southwest corner of sec. 8, T. 30 N., R. 8 W.

Ap—0 to 10 inches; black (10YR 2/1) loamy fine sand, dark grayish brown (10YR 4/2) dry; weak medium granular structure; very friable; common medium and fine roots; neutral; abrupt smooth boundary.

A—10 to 14 inches; very dark gray (10YR 3/1) loamy fine sand, gray (10YR 5/1) dry; weak fine granular structure; very friable; common fine roots; slightly acid; clear wavy boundary.

Bg1—14 to 21 inches; dark gray (10YR 4/1) fine sand; few medium distinct yellowish brown (10YR 5/8) mottles; weak fine granular structure; very friable; few fine roots; slightly acid; gradual wavy boundary.

Bg2—21 to 37 inches; light brownish gray (10YR 6/2) sand; common medium distinct brownish yellow (10YR 6/8) mottles; weak fine granular structure; very friable; neutral; gradual wavy boundary.

C—37 to 60 inches; pale brown (10YR 6/3) sand; common coarse distinct brownish yellow (10YR 6/8) mottles; single grain; loose; slight effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 40 inches. The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is mucky loamy fine sand, loamy fine sand, loamy sand, fine sand, or sand. The B horizon has hue of 10YR, value of 4 to 6, and chroma of 1 to 3. The C horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 4. It is sand or fine sand. It is neutral to moderately alkaline.

Houghton Series

The Houghton series consists of very deep, very poorly drained soils on outwash plains and recessional moraines. These soils formed in organic deposits. Permeability is moderately slow to moderately rapid. Slopes range from 0 to 2 percent.

Houghton soils are similar to Adrian and Toto soils and are adjacent to Adrian Variant soils on the landscape. These associated soils have sandy material within a depth of 51 inches. Adrian Variant soils are in the slightly higher positions on the landscape.

Typical pedon of Houghton muck, drained, in a

cultivated field; 1,100 feet west and 1,000 feet north of the southeast corner of sec. 35, T. 30 N., R. 9 W.

Op—0 to 10 inches; sapric material, black (10YR 2/1) broken face and rubbed; about 30 percent fiber, 4 percent rubbed; weak medium granular structure; very friable; many very fine roots; mostly herbaceous fiber; 5 percent mineral content; neutral; abrupt smooth boundary.

Oa1—10 to 17 inches; sapric material, very dark brown (10YR 2/2) broken face, very dark grayish brown (10YR 3/2) rubbed; about 33 percent fiber, 10 percent rubbed; moderate fine subangular blocky structure; friable; common very fine roots; mostly herbaceous fiber; 3 percent mineral content; neutral; gradual wavy boundary.

Oa2—17 to 30 inches; sapric material, very dark brown (10YR 2/2) broken face, very dark grayish brown (10YR 3/2) rubbed; about 40 percent fiber, 11 percent rubbed; moderate thin platy structure; friable; few very fine roots; mostly herbaceous fiber; 1 percent mineral content; slightly acid; clear wavy boundary.

Oa3—30 to 43 inches; sapric material, very dark brown (10YR 2/2) broken face, dark brown (7.5YR 3/2) rubbed; about 41 percent fiber, 10 percent rubbed; moderate medium platy structure; friable; few very fine roots; mostly herbaceous fiber; 1 percent mineral content; slightly acid; clear wavy boundary.

Oa4—43 to 60 inches; sapric material, very dark grayish brown (10YR 3/2) broken face and rubbed; about 39 percent fiber, 10 percent rubbed; weak medium platy structure; friable; mostly herbaceous fiber; 1 percent mineral content; neutral.

The organic material is more than 51 inches thick. The material is primarily herbaceous. Reaction ranges from medium acid to mildly alkaline. The surface tier has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2 or 3. Fiber content is dominantly less than 10 percent when rubbed. Mineral content ranges from 0 to 10 percent. The subsurface and bottom tiers have hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3, or they are neutral in hue and have value of 2 or 3. They are primarily sapric material, but thin layers of hemic material with a combined thickness of less than 10 inches are in some pedons. Fiber content is dominantly less than 15 percent when rubbed. Mineral content ranges from 0 to 4 percent.

Iroquois Series

The Iroquois series consists of very deep, very poorly drained soils on lake plains. These soils formed in loamy outwash over clayey lacustrine sediments. Permeability is moderate in the solum and slow in the substratum. Slopes range from 0 to 2 percent.

Iroquois soils are similar to Montgomery soils and are adjacent to Papineau, Simonin, Strole, and Wesley soils on the landscape. Montgomery and Strole soils have more clay in the upper part of the solum than the Iroquois soils. Papineau, Strole, and Wesley soils are browner in the upper part of the subsoil than the Iroquois soils. They are in the slightly higher areas. Simonin soils are browner throughout the profile than the Iroquois soils and have more sand in the upper part of the solum. They are in the higher landscape positions.

Typical pedon of Iroquois fine sandy loam, in a cultivated field; 2,200 feet east and 50 feet south of the northwest corner of sec. 3, T. 28 N., R. 8 W.

Ap—0 to 8 inches; black (10YR 2/1) fine sandy loam, dark gray (10YR 4/1) dry; moderate medium granular structure; friable; common medium roots; neutral; abrupt smooth boundary.

A—8 to 11 inches; very dark gray (10YR 3/1) fine sandy loam, dark grayish brown (10YR 4/2) dry; common medium distinct brown (10YR 5/3) mottles; weak medium subangular blocky structure; friable; few fine roots; neutral; clear smooth boundary.

Btg1—11 to 19 inches; grayish brown (10YR 5/2) sandy clay loam; few fine distinct yellowish brown (10YR 5/4) mottles; weak thick prismatic structure parting to moderate medium subangular blocky; friable; few very fine roots; thin patchy very dark gray (10YR 3/1) organic coatings on faces of prisms and peds; thin continuous dark gray (10YR 4/1) clay films on faces of prisms and peds; neutral; clear wavy boundary.

Btg2—19 to 32 inches; grayish brown (10YR 5/2) sandy clay loam; many coarse distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; friable; few very fine roots; thin patchy very dark gray (10YR 3/1) organic coatings on faces of prisms and peds; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of prisms and peds; neutral; gradual smooth boundary.

Btg3—32 to 36 inches; gray (10YR 5/1) clay loam; many medium distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure; firm; thin patchy dark grayish brown (10YR 4/2) clay films on faces of prisms; neutral; gradual wavy boundary.

2Cg—36 to 60 inches; gray (10YR 5/1) silty clay; many coarse distinct brownish yellow (10YR 6/6) mottles; massive; very firm; common white (10YR 8/1) accumulations of calcium carbonate; strong

effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 38 inches. The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The Btg horizon has hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 1 or 2. It is sandy loam, clay loam, or sandy clay loam. It is medium acid to neutral. The 2Cg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. It is silty clay or clay. It is mildly alkaline or moderately alkaline.

Kentland Series

The Kentland series consists of very deep, very poorly drained soils on lake plains. These soils formed in a thin layer of organic material and sandy sediments. Permeability is moderate in the organic material and rapid in the sandy deposits. Slopes are 0 to 1 percent.

Kentland soils are similar to Conrad soils and are adjacent to Ackerman, Tedrow, and Zaborosky soils on the landscape. Conrad soils have a thinner dark surface soil than the Kentland soils. Ackerman soils have coprogenous earth in the profile. They are in landscape positions similar to those of the Kentland soils. Tedrow and Zaborosky soils are browner in the upper part of the subsoil than the Kentland soils. They are in the slightly higher positions on the landscape.

Typical pedon of Kentland mucky fine sand, in a cultivated field; 150 feet south and 400 feet east of the northwest corner of sec. 13, T. 30 N., R. 9 W.

Ap—0 to 9 inches; black (10YR 2/1) mucky fine sand, dark gray (10YR 4/1) dry; weak fine granular structure; very friable; many fine roots; 10 percent organic matter; slightly acid; abrupt smooth boundary.

A—9 to 12 inches; black (N 2/0) mucky fine sand, dark gray (10YR 4/1) dry; common fine distinct strong brown (7.5YR 5/6) mottles; weak medium platy structure parting to weak fine granular; very friable; many fine and medium roots; 15 percent organic matter; neutral; clear wavy boundary.

2Oa—12 to 16 inches; sapric material, very dark grayish brown (10YR 3/2) broken face, dark grayish brown (10YR 4/2) rubbed; about 20 percent fiber, 3 percent rubbed; weak medium platy structure; friable; few fine roots; many very pale brown (10YR 7/3), light yellowish brown (10YR 6/4), and white (10YR 8/2) accumulations of marl making up about 25 percent of the horizon; mostly herbaceous fiber; strong effervescence; moderately alkaline; abrupt wavy boundary.

3C1—16 to 22 inches; light yellowish brown (10YR 6/4) fine sand; single grain; loose; strong effervescence; moderately alkaline; clear wavy boundary.

3C2—22 to 27 inches; dark yellowish brown (10YR 4/4) fine sand; common medium distinct brownish yellow (10YR 6/6) mottles; single grain; loose; strong effervescence; moderately alkaline; clear wavy boundary.

3C3—27 to 47 inches; yellowish brown (10YR 5/6) fine sand; single grain; loose; strong effervescence; moderately alkaline; clear wavy boundary.

3Cg—47 to 60 inches; grayish brown (2.5Y 5/2) fine sand; many coarse faint light olive brown (2.5Y 5/4) mottles; single grain; loose; strong effervescence; moderately alkaline.

The depth to free carbonates ranges from 10 to 18 inches. The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2. It is slightly acid or neutral. The 2Oa horizon has hue of 10YR, value of 2 to 4, and chroma of 1 to 3. It is strongly or violently effervescent and contains 20 to 30 percent marl. The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 8. It is strongly or violently effervescent and is mildly alkaline or moderately alkaline.

Martinsville Series

The Martinsville series consists of very deep, well drained, moderately permeable soils on terraces and ground moraines. These soils formed in loamy outwash. Slopes range from 0 to 6 percent.

Martinsville soils are similar to Foresman, Glenhall, and Miami soils and are adjacent to Ross, Sawabash, Whitaker, and Williamstown soils on the landscape. Foresman and Glenhall soils have a darker surface layer than the Martinsville soils. Miami soils have a solum that is less than 40 inches thick. They have less sand in the lower part of the subsoil than the Martinsville soils. Ross soils have a thick, dark surface soil more than 24 inches thick. Sawabash soils are grayer in the profile than the Martinsville soils. They are in the lower lying areas adjacent to slopes. Whitaker soils are grayer in color throughout than the Martinsville soils, and Williamstown soils are grayer in the subsoil. Whitaker and Williamstown soils are in the less sloping areas.

Typical pedon of Martinsville fine sandy loam, in an area of Martinsville-Williamstown complex, 2 to 6 percent slopes, eroded, in a cultivated field; 1,500 feet east and 440 feet north of the southwest corner of sec. 1, T. 27 N., R. 10 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) fine sandy loam, light brownish gray (10YR 6/2) dry; mixed with brown (10YR 4/3) clay loam from the subsoil; moderate medium granular structure;

friable; common very fine roots; 1 percent gravel; slightly acid; abrupt smooth boundary.

Bt1—9 to 20 inches; brown (10YR 4/3) clay loam; moderate fine subangular blocky structure; friable; common very fine roots; thin discontinuous dark brown (10YR 4/3) clay films on faces of peds; 3 percent gravel; medium acid; clear wavy boundary.

Bt2—20 to 31 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium subangular blocky structure; friable; few very fine roots; thin continuous brown (7.5YR 4/4) clay films on faces of peds; 3 percent gravel; medium acid; clear wavy boundary.

Bt3—31 to 38 inches; strong brown (7.5YR 5/6) loam; moderate medium subangular blocky structure; friable; few very fine roots; thin continuous brown (7.5YR 4/4) clay films on faces of peds; 3 percent gravel; medium acid; gradual wavy boundary.

BCt—38 to 46 inches; dark yellowish brown (10YR 4/6) sandy loam; weak medium subangular blocky structure; friable; thin patchy strong brown (7.5YR 4/6) clay films on faces of peds; 2 percent gravel; slightly acid; gradual wavy boundary.

C—46 to 60 inches; yellowish brown (10YR 5/4) sandy loam; massive; friable; 2 percent gravel; thin strata of silt loam and loamy sand totaling 7 inches; neutral.

The thickness of the solum ranges from 40 to 60 inches. The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is loam or fine sandy loam. The Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. It is clay loam or sandy clay loam in the upper part and sandy clay loam, loam, or sandy loam in the lower part. The content of gravel ranges from 0 to 5 percent by volume. This horizon is strongly acid to slightly acid. The C horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. It is sandy loam, loam, or silt loam and contains strata of sandy textures. It is medium acid to moderately alkaline.

Martisco Variant

The Martisco Variant consists of very deep, very poorly drained soils on outwash plains and lake plains. These soils formed in marl and coprogenous earth over sandy deposits. Permeability is slow in the coprogenous earth, variable in the marl, and rapid in the underlying sandy sediments. Slopes range from 0 to 2 percent.

Martisco Variant soils are similar to Ackerman and Adrian Variant soils and are adjacent to Toto soils on the landscape. Ackerman soils formed in organic material and coprogenous earth over sandy deposits. They are in the slightly lower areas. Adrian Variant soils do not have marl and coprogenous earth in the profile. Toto soils formed in organic material over marl, coprogenous earth, and sandy deposits. Ackerman and Toto soils are in landscape positions similar to those of the Martisco Variant soils.

Typical pedon of Martisco Variant mucky loam, in an area of Ackerman-Martisco Variant complex, drained, in a cultivated field; 1,100 feet north and 200 feet east of the southwest corner of sec. 11, T. 30 N., R.9 W.

Ap—0 to 10 inches; dark reddish brown (5YR 3/4) mucky loam, dark reddish brown (5YR 3/4) dry; weak medium granular structure; friable; many fine roots; strong effervescence; moderately alkaline; abrupt smooth boundary.

Cg1—10 to 13 inches; reddish gray (5YR 5/2) marl; common medium distinct dark gray (10YR 4/1) mottles; friable; many fine roots; strong effervescence; moderately alkaline; abrupt smooth boundary.

Cg2—13 to 16 inches; gray (5YR 5/1) marl; many medium distinct reddish brown (5YR 4/3) and few medium faint gray (5YR 6/1) mottles; massive; slightly plastic; common fine roots; few very fine white (N 8/0) shell fragments; strong effervescence; moderately alkaline; clear wavy boundary.

Cg3—16 to 21 inches; gray (10YR 5/1) marl; common medium prominent reddish brown (5YR 5/4) mottles; massive; slightly plastic; few fine roots; many fine white (N 8/0) shell fragments; strong effervescence; moderately alkaline; clear wavy boundary.

Cg4—21 to 26 inches; dark grayish brown (2.5Y 4/2) coprogenous earth; common medium distinct strong brown (7.5YR 5/6) mottles; massive; slightly plastic; few fine roots; sodium pyrophosphate extract is white (10YR 8/1); strong effervescence; moderately alkaline; clear wavy boundary.

Cg5—26 to 30 inches; dark greenish gray (5G 4/1) coprogenous earth; few medium prominent weak red (2.5YR 4/2) and many coarse prominent dark red (2.5YR 3/6) mottles; massive; firm; few fine roots; sodium pyrophosphate extract is white (10YR 8/1); thin strata of loamy sand and sand totaling 2 inches; strong effervescence; moderately alkaline; abrupt wavy boundary.

Cg6—30 to 37 inches; reddish gray (5YR 5/2) sand; many medium distinct reddish brown (5YR 5/4) mottles; few fine roots; thin strata of loamy sand totaling 1 inch; single grain; loose; strong effervescence; moderately alkaline; clear wavy boundary.

C—37 to 60 inches; dark brown (10YR 4/3) sand; few coarse prominent dark gray (5YR 4/1) mottles; single grain; loose; strong effervescence; moderately alkaline.

The thickness of the marl ranges from 10 to 30 inches. The thickness of the coprogenous earth ranges from 2 to 20 inches but is dominantly more than 5 inches. The Ap horizon has hue of 10YR, 7.5YR, or 5YR, value of 2 to 4, and chroma of 1 to 3. The C horizon of marl has hue of 5Y, 10YR, 7.5YR, or 5YR, value of 5 or 6, and chroma of 1 to 4. The C horizon of coprogenous earth has hue of 2.5Y, 5Y, or 5G, value of 4 or 5, and chroma of 1 or 2. It is mildly alkaline or moderately alkaline. The C horizon of sand has hue of 10YR, 7.5YR, or 5YR, value of 4 to 6, and chroma of 2 to 6. It is mildly alkaline or moderately alkaline.

Maumee Series

The Maumee series consists of very deep, very poorly drained, rapidly permeable soils on outwash plains and lake plains. These soils formed in sandy sediments. Slopes range from 0 to 2 percent.

Maumee soils are similar to Barry, Gilford, Granby, and Zadog soils and are adjacent to Brems and Watseka soils on the landscape. Barry and Gilford soils have more clay in the solum than the Maumee soils. Granby soils have a thinner dark surface soil than the Maumee soils. They are in the higher positions on the landscape. Brems soils have a thinner, lighter colored surface soil than the Maumee soils and are less gray throughout. They are higher on the landscape than the Maumee soils. Zadog soils have iron nodules and contain more clay in the solum than the Maumee soils. They are in the lower areas. Watseka soils are browner in the upper part of the subsoil than the Maumee soils. They are in the slightly higher areas.

Typical pedon of Maumee loamy fine sand, in a cultivated field; 150 feet west and 1,800 feet south of the northeast corner of sec. 7, T. 30 N., R. 8 W.

Ap—0 to 9 inches; black (N 2/0) loamy fine sand, dark grayish brown (10YR 4/2) dry; weak fine granular structure; very friable; common fine and medium roots; neutral; abrupt smooth boundary.

A—9 to 18 inches; very dark gray (10YR 3/1) loamy fine sand, dark grayish brown (10YR 4/2) dry; weak fine granular structure; very friable; few fine roots; neutral; clear wavy boundary.

Cg1—18 to 22 inches; dark gray (10YR 4/1) sand; few fine distinct dark brown (10YR 4/3) mottles; single grain; loose; common very dark gray (10YR 3/1) krotovinas; neutral; clear wavy boundary.

Cg2—22 to 30 inches; dark grayish brown (10YR 4/2) sand; few fine distinct dark yellowish brown (10YR 4/4) mottles; single grain; loose; few very dark gray (10YR 3/1) krotovinas; neutral; gradual wavy boundary.

Cg3—30 to 40 inches; grayish brown (10YR 5/2) sand; few fine distinct yellowish brown (10YR 5/4) mottles; single grain; loose; neutral; gradual wavy boundary.

Cg4—40 to 50 inches; grayish brown (10YR 5/2) sand; common medium distinct yellowish brown (10YR 5/8) mottles; single grain; loose; neutral; gradual wavy boundary.

C—50 to 60 inches; brown (10YR 5/3) fine sand; few medium distinct dark brown (7.5YR 4/4) mottles; single grain; loose; slight effervescence; mildly alkaline.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2. It is sand, loamy sand, loamy fine sand, or the mucky analogs of these textures. The Cg and C horizons have hue of 10YR, value of 4 to 6, and chroma of 1 to 3. They are sand, loamy sand, fine sand, or loamy fine sand. They are slightly acid to moderately alkaline.

Miami Series

The Miami series consists of very deep, well drained soils on ground moraines. These soils formed in glacial till. Permeability is moderate in the solum and very slow or slow in the substratum. Slopes range from 6 to 25 percent.

Miami soils are similar to Foresman, Glenhall, and Martinsville soils and are adjacent to Comfrey, Sawabash, and Williamstown soils on the landscape. Foresman and Glenhall soils have a darker surface layer than the Miami soils, and Martinsville soils have more sand in the lower part of the subsoil. Comfrey and Sawabash soils are grayer than the Miami soils. They are in the lower lying positions on the landscape. Williamstown soils are grayer in the subsoil than the Miami soils. They are in the less sloping areas.

Typical pedon of Miami loam, 15 to 25 percent slopes, in a wooded area; 400 feet east and 510 feet north of the southwest corner of sec. 29, T. 28 N., R. 8 W.

A—0 to 5 inches; dark gray (10YR 4/1) loam, light brownish gray (10YR 6/2) dry; weak medium granular structure; friable; many medium and fine roots; 2 percent gravel; slightly acid; abrupt smooth boundary.

E—5 to 8 inches; pale brown (10YR 6/3) loam; weak fine subangular blocky structure; friable; many medium and fine roots; 2 percent gravel; slightly acid; clear smooth boundary.

Bt1—8 to 17 inches; dark yellowish brown (10YR 4/4) clay loam; weak fine subangular blocky structure; friable; common fine roots; thin continuous brown (10YR 4/3) clay films on faces of peds; 2 percent gravel; medium acid; clear wavy boundary.

Bt2—17 to 29 inches; yellowish brown (10YR 5/6) clay loam; moderate fine subangular blocky structure; friable; common fine roots; thin continuous brown (10YR 4/3) clay films on faces of peds; 3 percent gravel; medium acid; clear wavy boundary.

Bt3—29 to 33 inches; yellowish brown (10YR 5/4) loam; weak medium subangular blocky structure; friable; few fine roots; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; 3 percent gravel; neutral; clear wavy boundary.

Cd—33 to 60 inches; yellowish brown (10YR 5/4) loam; massive; very firm; 3 percent gravel; slight effervescence; mildly alkaline.

The thickness of the solum ranges from 24 to 40 inches. Some pedons have an Ap horizon. The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. Pedons in areas that have not been cultivated have an A horizon, which has hue of 10YR, value of 3 or 4, and chroma of 1 or 2. The A horizon is loam or silt loam. The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 6. The Cd horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4. It is mildly alkaline or moderately alkaline.

Montgomery Series

The Montgomery series consists of very deep, very poorly drained, slowly permeable soils on lake plains. These soils formed in stratified lacustrine sediments. Slopes are 0 to 1 percent.

Montgomery soils are similar to Iroquois soils and are adjacent to Simonin and Strole soils on the landscape. Iroquois soils have less clay in the upper part of the solum than the Montgomery soils. Simonin soils have more sand in the upper part of the solum than the Montgomery soils and are predominantly browner throughout. They are in the higher positions on the landscape. Strole soils are browner in the upper part of the subsoil than the Montgomery soils. They are in the slightly higher areas.

Typical pedon of Montgomery silty clay loam, in a cultivated field; 1,380 feet south and 2,600 feet east of the northwest corner of sec. 16, T. 28 N., R. 8 W.

Ap—0 to 10 inches; black (10YR 2/1) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

A1—10 to 14 inches; black (10YR 2/1) silty clay loam, dark grayish brown (10YR 4/2) dry; few medium distinct grayish brown (10YR 5/2) mottles; moderate fine subangular blocky structure; friable; few fine roots; thin discontinuous very dark gray (10YR 3/1) organic coatings on faces of peds and in root channels; neutral; clear wavy boundary.

A2—14 to 17 inches; very dark gray (10YR 3/1) silty clay, grayish brown (10YR 5/3) dry; many medium distinct dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; friable; few fine roots; thin discontinuous dark gray (10YR 4/1) organic coatings on faces of peds and in root channels; mildly alkaline; clear wavy boundary.

Bg1—17 to 31 inches; gray (10YR 5/1) silty clay; many medium distinct yellowish brown (10YR 5/4) and light olive brown (2.5Y 5/4) mottles; strong medium subangular blocky structure; firm; few very fine roots; many very dark gray (10YR 3/1) krotovinas; mildly alkaline; clear wavy boundary.

Bg2—31 to 35 inches; light gray (5Y 6/1) silty clay loam; many medium distinct olive (5Y 5/4) and pale olive (5Y 6/3) mottles; strong medium subangular blocky structure; firm; few very fine roots; slight effervescence; mildly alkaline; clear wavy boundary.

Bg3—35 to 44 inches; grayish brown (2.5Y 5/2) silty clay loam; many medium distinct yellowish brown (10YR 5/8) mottles; weak medium prismatic structure parting to strong medium angular blocky; firm; thin discontinuous light gray (5Y 6/1) silt coatings on faces of prisms and peds; strong effervescence; moderately alkaline; clear wavy boundary.

C—44 to 50 inches; light olive brown (2.5Y 5/4) silty clay; many medium distinct dark yellowish brown (10YR 4/4) mottles; weak medium prismatic structure parting to strong medium angular blocky; very firm; thin discontinuous gray (5Y 5/1) silt coatings on faces of prisms and peds; few light gray (10YR 7/1) accumulations of calcium carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

Cg—50 to 60 inches; grayish brown (2.5Y 5/2) silty clay; many medium distinct olive (5Y 5/4) and olive brown (2.5Y 4/4) mottles; massive; very firm; thick continuous gray (5Y 5/1) pressure faces; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches. The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is silty clay loam or silty clay. The Bg horizon has hue of 10YR, 2.5Y, or 5Y, value of 3 to 6, and chroma of 1 or 2, or it is neutral in hue and has value of 4 to 6. It is mainly slightly acid to mildly alkaline, but the range includes moderately alkaline in the lower part. The C horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 to 4. It is silty clay loam or silty clay.

Montmorenci Series

The Montmorenci series consists of very deep, moderately well drained soils on ground moraines and recessional moraines. These soils formed in glacial till. Permeability is moderate or moderately slow in the solum and very slow or slow in the substratum. Slopes range from 1 to 6 percent.

The Montmorenci soils in this survey area are browner in the upper part of the subsoil than is defined as the range for the series. This difference, however, does not affect the use or management of these soils.

Montmorenci soils are similar to Corwin and Octagon soils and are adjacent to Barce, Odell, and Peotone soils on the landscape. Corwin soils have a thicker dark surface soil than the Montmorenci soils. Octagon soils do not have gray mottles in the lower part of the subsoil. Barce soils have more sand in the upper part of the subsoil than the Montmorenci soils, and Odell and Peotone soils are grayer in the subsoil. Odell soils are in the slightly lower lying areas. Peotone soils have more clay in the solum than the Montmorenci soils. They are in depressional areas.

Typical pedon of Montmorenci loam, in an area of Barce-Montmorenci complex, 1 to 4 percent slopes, eroded, in a cultivated field; 1,400 feet east and 125 feet north of the southwest corner of sec. 25, T. 27 N., R. 8 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; mixed with dark yellowish brown (10YR 4/4) clay loam from the subsoil; weak fine subangular blocky structure parting to weak fine granular; friable; common very fine roots; 2 percent gravel; neutral; abrupt smooth boundary.

Bt1—8 to 25 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium subangular blocky structure; firm; few very fine roots; thin discontinuous brown (10YR 4/3) clay films on faces of peds; 2 percent gravel; few very dark grayish brown (10YR 3/2) material filling old root channels and worm channels; slightly acid; clear wavy boundary.

Bt2—25 to 32 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium subangular blocky structure; firm; few very fine roots; thin discontinuous brown (10YR 4/3) clay films on faces of peds; 2 percent gravel; neutral; clear wavy boundary.

BCt—32 to 37 inches; yellowish brown (10YR 5/4) loam; common fine distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; firm; few very fine roots; thin patchy dark yellowish brown (10YR 4/4) clay films on faces of peds; 4 percent gravel; mildly alkaline; clear wavy boundary.

Cd—37 to 60 inches; yellowish brown (10YR 5/4) loam; common medium distinct light brownish gray (10YR 6/2) mottles; massive; very firm; 5 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 40 inches. The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. It is loam, silt loam, or fine sandy loam. The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. It is loam or clay loam. It ranges from medium acid to neutral. The Cd horizon has hue of 10YR, value of 5, and chroma of 3 or 4. It is mildly alkaline or moderately alkaline.

Morocco Series

The Morocco series consists of very deep, somewhat poorly drained, rapidly permeable soils on outwash plains. These soils formed in acid sand and fine sand deposits. Slopes range from 0 to 2 percent.

Morocco soils are similar to Algansee, Tedrow, Watseka, and Zaborosky soils and are adjacent to Brems, Granby, Newton, and Oakville soils on the landscape. Algansee soils have an irregular decrease in organic matter. Tedrow soils are less acid than the Morocco soils. Watseka soils have a thicker dark surface soil than the Morocco soils. Zaborosky soils have a buried A horizon. Brems soils are less gray in the upper part of the subsoil than the Morocco soils. They are in the higher positions on the landscape. Granby and Newton soils are grayer in the upper part of the subsoil than the Morocco soils. They are in the lower positions. Oakville soils do not have gray mottles in the subsoil. They are in the more sloping areas.

Typical pedon of Morocco loamy sand, in a cultivated field; 2,200 feet east and 800 feet south of the northwest corner of sec. 35, T. 31 N., R. 9 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loamy sand, light brownish gray (10YR 6/2) dry; weak medium granular structure; very friable; common fine roots; very strongly acid; abrupt smooth boundary.

Bw1—9 to 20 inches; pale brown (10YR 6/3) fine sand; many medium distinct yellowish brown (10YR 5/6) mottles; weak fine granular structure; very friable; few fine roots; many accumulations of white (10YR 8/1), uncoated sand grains; very strongly acid; clear wavy boundary.

Bw2—20 to 28 inches; yellowish brown (10YR 5/6) fine sand; many medium distinct light brownish gray (10YR 6/2) mottles; weak fine granular structure;

very friable; many accumulations of white (10YR 8/1), uncoated sand grains; very strongly acid; clear wavy boundary.

Bw3—28 to 37 inches; pale brown (10YR 6/3) fine sand; many medium distinct yellowish brown (10YR 5/6) mottles; weak fine granular structure; very friable; many accumulations of light yellowish brown (10YR 6/4) and white (10YR 8/1), uncoated sand grains; very strongly acid; clear wavy boundary.

Cg—37 to 42 inches; light brownish gray (10YR 6/2) fine sand; common medium distinct yellowish brown (10YR 5/4) mottles; single grain; loose; many accumulations of white (10YR 8/1), uncoated sand grains; very strongly acid; clear wavy boundary.

C1—42 to 48 inches; yellowish brown (10YR 5/4) fine sand; many medium distinct brown (7.5YR 5/4) mottles; single grain; loose; few accumulations of very pale brown (10YR 8/3), uncoated sand grains; very strongly acid; clear wavy boundary.

C2—48 to 54 inches; reddish brown (5YR 5/4) fine sand; many coarse distinct strong brown (7.5YR 5/6) mottles; single grain; loose; few accumulations of white (10YR 8/1) and very pale brown (10YR 8/3), uncoated sand grains; very strongly acid; clear wavy boundary.

C'g—54 to 60 inches; light brownish gray (10YR 6/2) fine sand; common medium distinct yellowish brown (10YR 5/6) and light yellowish brown (10YR 6/4) mottles; single grain; loose; few accumulations of white (10YR 8/1), uncoated sand grains; very strongly acid.

The thickness of the solum ranges from 24 to 48 inches. The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 1 to 3. It is loamy fine sand, loamy sand, fine sand, or sand. The Bw horizon dominantly has hue of 10YR, but the range includes 5YR. This horizon has value of 5 to 7 and chroma of 2 to 8. It is loamy fine sand, fine sand. or sand. It is medium acid to very strongly acid. The C horizon has hue of 10YR, 7.5YR, or 5YR, value of 5 to 7, and chroma of 2 to 8. It is fine sand or sand. It is medium acid to very strongly acid.

Nesius Series

The Nesius series consists of very deep, moderately well drained, rapidly permeable soils on lake plains, outwash plains, and recessional moraines. These soils formed in sandy sediments. Slopes are 0 to 4 percent.

Nesius soils are similar to Brems soils and are adjacent to Ayrmount, Sparta, and Watseka soils on the landscape. Brems soils have a thinner, lighter colored surface soil than the Nesius soils. Ayrmount soils have less sand and more clay in the lower part of the solum than the Nesius soils. They are in the lower positions on the landscape. Sparta soils have a browner subsoil than the Nesius soils. They are in the highest areas. Watseka soils are grayer in the subsoil than the Nesius soils. They are in the lower areas.

Typical pedon of Nesius loamy fine sand, 1 to 4 percent slopes, in a hay field; 2,400 feet west and 1,000 feet south of the northeast corner of sec. 21, T. 29 N., R. 8 W.

Ap—0 to 10 inches; black (10YR 2/1) loamy fine sand, dark grayish brown (10YR 4/2) dry; weak fine granular structure; very friable; many fine roots; slightly acid; abrupt smooth boundary.

A—10 to 15 inches; very dark brown (10YR 2/2) loamy fine sand, dark grayish brown (10YR 4/2) dry; weak fine granular structure; very friable; common fine and very fine roots; slightly acid; clear smooth boundary.

Bw1—15 to 25 inches; dark brown (10YR 4/3) fine sand; weak fine granular structure; very friable; few fine roots; slightly acid; clear wavy boundary.

Bw2—25 to 33 inches; yellowish brown (10YR 5/4) fine sand; few medium faint dark yellowish brown (10YR 4/4) mottles; weak fine granular structure; very friable; slightly acid; gradual wavy boundary.

Bw3—33 to 43 inches; light yellowish brown (10YR 6/4) fine sand; many medium distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/8) mottles; weak fine granular structure; very friable; loose; slightly acid; clear wavy boundary.

Bw4—43 to 53 inches; strong brown (7.5YR 4/6) fine sand; common coarse prominent gray (N 5/0) mottles; weak fine granular structure; very friable; slightly acid; clear wavy boundary.

C—53 to 60 inches; yellowish brown (10YR 5/4) fine sand; common medium distinct gray (10YR 5/1) and common medium faint yellowish brown (10YR 5/6) mottles; single grain; loose; neutral.

The thickness of the solum ranges from 40 to 60 inches. The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is loamy fine sand or loamy sand. The Bw horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. It is fine sand, sand, or loamy fine sand and is slightly acid or neutral. The C horizon has hue of 10YR, value of 5 or 6, and chroma of 2 to 6. It is fine sand or sand.

Newton Series

The Newton series consists of very deep, very poorly drained, rapidly permeable soils on outwash plains and lake plains. These soils formed in sandy sediments. Slopes are 0 to 2 percent.

The Newton soils in this survey area have a thinner surface layer than is defined as the range for the series. This difference, however, does not affect the use or management of these soils.

Newton soils are adjacent to Brems, Morocco, and Oakville soils on the landscape. Brems soils have a thinner, lighter colored surface soil than the Newton soils and are less gray throughout. They are in the higher positions on the landscape. Morocco soils are browner in the upper part of the subsoil than the Newton soils. Also, they are higher on the landscape. Oakville soils are browner throughout than the Newton soils. They are in the highest positions on the landscape.

Typical pedon of Newton loamy fine sand, undrained, in a wooded area; 2,250 feet west and 1,600 feet north of the southeast corner of sec. 1, T. 29 N., R. 10 W.

A—0 to 5 inches; very dark grayish brown (10YR 3/2) loamy fine sand, grayish brown (10YR 5/2) dry; weak fine granular structure; very friable; many fine roots; few streaks of light gray (10YR 7/2), uncoated sand grains; very strongly acid; abrupt smooth boundary.

Cg1—5 to 16 inches; gray (10YR 5/1) fine sand; single grain; loose; common fine roots; common strong brown (7.5YR 5/8) iron stains around old root channels; very strongly acid; clear wavy boundary.

Cg2—16 to 23 inches; brown (10YR 5/3) fine sand; common medium distinct strong brown (7.5YR 5/8) mottles; single grain; loose; few fine roots; very strongly acid; clear wavy boundary.

Cg3—23 to 27 inches; brown (10YR 5/3) fine sand; many coarse distinct strong brown (7.5YR 5/8) mottles; single grain; loose; extremely acid; clear wavy boundary.

Cg4—27 to 33 inches; light gray (10YR 6/1) fine sand; common fine distinct strong brown (7.5YR 5/8) mottles; single grain; loose; extremely acid; clear wavy boundary.

Cg5—33 to 39 inches; light brownish gray (10YR 6/2) fine sand; common medium distinct yellowish brown (10YR 5/6) mottles; single grain; loose; extremely acid; clear wavy boundary.

Cg6—39 to 44 inches; light gray (10YR 6/1) fine sand; few medium distinct yellowish brown (10YR 5/8) mottles; single grain; loose; very strongly acid; clear wavy boundary.

Cg7—44 to 47 inches; light gray (10YR 7/2) sand; many medium distinct yellowish brown (10YR 5/6) mottles; single grain; loose; very strongly acid; clear wavy boundary.

Cg8—47 to 53 inches; light gray (10YR 7/2) sand; common medium distinct yellowish brown (10YR 5/6) mottles; single grain; loose; very strongly acid; clear wavy boundary.

Cg9—53 to 60 inches; pale brown (10YR 6/3) sand; few fine distinct yellowish brown (10YR 5/4) mottles; single grain; loose; very strongly acid.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is sand, fine sand, loamy sand, or loamy fine sand. It is very strongly acid to medium acid. The C horizon has hue of 10YR, value of 4 to 7, and chroma of 1 to 3. It is sand, fine sand, or loamy fine sand and is extremely acid to medium acid.

Oakville Series

The Oakville series consists of very deep, moderately well drained and well drained, rapidly permeable soils on outwash plains and ground moraines. These soils formed in sandy sediments. Slopes range from 1 to 15 percent.

Oakville soils are similar to Sparta soils and are adjacent to Brems, Morocco, Newton, Wallkill Variant, and Zaborosky soils on the landscape. Sparta soils have a thinner, darker surface soil than the Oakville soils. Brems, Morocco, and Zaborosky soils have gray mottles in the subsoil. They are in the slightly lower positions on the landscape. Newton soils are grayer throughout than the Oakville soils. Also, they are lower on the landscape. Wallkill Variant soils are gray in the subsoil. They have more clay in the solum than the Oakville soils and are underlain by organic deposits. They are in the lower areas.

Typical pedon of Oakville fine sand, 2 to 6 percent slopes, in a wooded area; 1,050 feet east and 2,640 feet north of the southwest corner of sec. 22, T. 31 N., R. 9 W.

A—0 to 6 inches; very dark grayish brown (10YR 3/2) fine sand, light brownish gray (10YR 6/2) dry; weak medium granular structure; very friable; many medium and fine roots; strongly acid; clear wavy boundary.

Bw1—6 to 16 inches; brown (7.5YR 4/4) fine sand; weak medium granular structure; very friable; many medium and fine roots; strongly acid; clear wavy boundary.

Bw2—16 to 36 inches; yellowish brown (10YR 5/6) fine sand; weak medium granular structure; very friable; few medium roots; strongly acid; gradual wavy boundary.

C—36 to 60 inches; pale brown (10YR 6/3) sand; single grain; loose; medium acid.

The thickness of the solum ranges from 20 to 40 inches. The A horizon has hue of 10YR, value of 3 or 4,

and chroma of 1 to 4. The Bw horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. It is very strongly acid to neutral. The C horizon has hue of 10YR, value of 5 or 6, and chroma of 2 to 6. It is fine sand or sand. It is medium acid to neutral. A moderately wet phase of this series is recognized.

Octagon Series

The Octagon series consists of very deep, well drained soils on moraines. These soils formed in glacial till. Permeability is moderate in the upper part and moderately slow in the lower part. Slopes range from 2 to 12 percent.

Octagon soils are similar to Corwin and Montmorenci soils and are adjacent to Ayr, Barry, Sumava, and Wallkill soils on the landscape. Corwin soils have gray mottles in the lower part of the solum. Montmorenci soils have gray mottles in the lower part of the subsoil. Ayr soils have less clay and more sand in the upper part of the solum than the Octagon soils. Also, they are lower on the landscape. Barry soils are grayer throughout than the Octagon soils. They are in the lower positions on the landscape. Sumava soils are grayer in the subsoil than the Octagon soils. Also, they are lower on the landscape. Wallkill soils have a thicker dark surface soil over muck deposits than the Octagon soils. They are in the lowest positions on the landscape.

Typical pedon of Octagon fine sandy loam, in an area of Octagon-Ayr complex, 2 to 6 percent slopes, eroded, in a cultivated field; 500 feet north and 1,400 feet east of the southwest corner of sec. 36, T. 29 N., R. 9 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) fine sandy loam, grayish brown (10YR 5/2) dry; mixed with dark yellowish brown (10YR 4/4) loam from the subsoil; moderate medium granular structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

Bt1—9 to 16 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular blocky structure; friable; few fine roots; thin discontinuous brown (10YR 4/3) clay films on faces of peds; 2 percent gravel; slightly acid; clear wavy boundary.

Bt2—16 to 31 inches; yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; friable; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; 3 percent gravel; neutral; clear wavy boundary.

C—31 to 60 inches; brown (10YR 5/3) loam; massive; friable; few light gray (10YR 7/1) accumulations of carbonate; 3 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 40 inches. The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. It is fine sandy loam or loam. The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. It is medium acid to neutral. The C horizon has hue of 10YR, value of 5, and chroma of 3 or 4. It is mildly alkaline or moderately alkaline.

Odell Series

The Odell series consists of very deep, somewhat poorly drained soils on ground moraines. These soils formed in glacial till. Permeability is moderate in the upper part of the solum, moderately slow in the lower part of the solum, and slow or very slow in the substratum. Slopes range from 0 to 2 percent.

Odell soils are adjacent to Corwin, Gilboa, Montmorenci, Ridgeville, and Sumava soils on the landscape. Corwin and Montmorenci soils are browner in the subsoil than the Odell soils. They are in the higher positions on the landscape. Gilboa, Ridgeville, and Sumava soils have more sand in the upper part of the subsoil than the Odell soils, and Ridgeville and Sumava soils also have less clay in the subsoil. Ridgeville and Sumava soils are lower on the landscape than the Odell soils. Gilboa soils are in the lower lying areas.

Typical pedon of Odell silt loam, in an area of Gilboa-Odell complex, 0 to 2 percent slopes, in a cultivated field; 2,400 feet west and 800 feet south of the northeast corner of sec. 22, T. 27 N., R. 9 W.

Ap—0 to 10 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate medium granular structure; friable; common medium and fine roots; 1 percent gravel; slightly acid; abrupt smooth boundary.

AB—10 to 13 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak fine subangular blocky structure; friable; few fine roots; 1 percent gravel; neutral; abrupt smooth boundary.

Bt1—13 to 19 inches; dark yellowish brown (10YR 4/4) clay loam; common medium faint dark yellowish brown (10YR 4/6) mottles; moderate medium subangular blocky structure; friable; few fine roots; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; 2 percent gravel; few very dark grayish brown (10YR 3/2) organic stains in old root channels; slightly acid; clear wavy boundary.

Bt2—19 to 26 inches; dark brown (10YR 4/3) clay loam; common medium distinct yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; friable; thin discontinuous dark grayish brown (10YR

4/2) clay films on faces of peds; 3 percent gravel; common black (10YR 2/1) iron and manganese oxide accumulations; medium acid; clear wavy boundary.

Bt3—26 to 29 inches; brown (10YR 5/3) clay loam; many medium faint grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; friable; thin discontinuous grayish brown (10YR 5/2) clay films on faces of peds; 3 percent gravel; common black (10YR 2/1) iron and manganese oxide accumulations; neutral; clear wavy boundary.

BC—29 to 35 inches; yellowish brown (10YR 5/4) loam; many medium faint yellowish brown (10YR 5/6) and many medium distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; 3 percent gravel; slight effervescence; mildly alkaline; clear wavy boundary.

Cd—35 to 60 inches; yellowish brown (10YR 5/4) loam; many medium distinct light brownish gray (10YR 6/2) mottles; massive; very firm; 5 percent gravel; many light gray (10YR 7/1) accumulations of calcium carbonate; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 40 inches. The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is silt loam or loam. The Bt horizon has hue of 10YR, value of 4 to 6, and chroma of 3 or 4. It is loam or clay loam. The Cd horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. It is mildly alkaline or moderately alkaline.

Onarga Series

The Onarga series consists of very deep, moderately well drained soils on outwash plains and moraines. These soils formed in sandy and loamy outwash deposits. Permeability is moderately rapid in the solum and rapid in the substratum. In the till substratum phase, permeability is moderately rapid in the solum, rapid in the upper part of the substratum, and moderately slow in the lower part. Slopes range from 0 to 6 percent.

Onarga soils are similar to Elston Variant soils and Ormas soils and are adjacent to Ridgeville soils on the landscape. Elston Variant soils have less clay in the lower part of the subsoil than the Onarga soils and are not stratified in the substratum. Ormas soils have more sand in the surface layer than the Onarga soils. Ridgeville soils are grayer in the subsoil than the Onarga soils. They are in the slightly lower lying positions.

Typical pedon of Onarga fine sandy loam, moderately wet, 2 to 6 percent slopes, eroded, in a cultivated field; 1,200 feet west and 820 feet north of the southeast corner of sec. 12, T. 27 N., R. 8 W.

Ap—0 to 10 inches; dark brown (10YR 3/3) fine sandy loam, brown (10YR 5/3) dry; mixed with dark brown (10YR 4/3) sandy loam from the subsoil; weak fine granular structure; very friable; common very fine roots; slightly acid; abrupt smooth boundary.

BA—10 to 18 inches; dark brown (10YR 4/3) sandy loam; weak fine subangular blocky structure; friable; few very fine roots; medium acid; clear wavy boundary.

Bt1—18 to 34 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; friable; few very fine roots; thin dark yellowish brown (10YR 4/4) clay bridges between sand grains; 2 percent gravel; medium acid; gradual wavy boundary.

Bt2—34 to 50 inches; yellowish brown (10YR 5/6) sandy loam; common fine distinct strong brown (7.5YR 5/8) and common medium distinct grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; friable; thin dark yellowish brown (10YR 4/4) clay bridges between sand grains; 2 percent gravel; medium acid; clear wavy boundary.

C—50 to 60 inches; brown (10YR 5/3) loamy fine sand; common fine distinct strong brown (7.5YR 5/8) and common medium distinct light brownish gray (10YR 6/2) mottles; massive; very friable; 1 percent gravel; thin strata of brown (10YR 5/3) fine sandy loam totaling 2 inches; medium acid.

The thickness of the solum ranges from 30 to 50 inches. The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. It is fine sandy loam or sandy loam. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is sandy loam or fine sandy loam. It ranges from neutral to strongly acid. The C horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. It is stratified fine sandy loam, sandy loam, loamy sand, sand, loamy fine sand, or fine sand. It is strongly acid to neutral. A till substratum phase of this series is recognized. Reaction is mildly alkaline or moderately alkaline in the glacial till.

Ormas Series

The Ormas series consists of very deep, well drained soils on terraces and moraines. These soils formed in sandy and loamy outwash. Permeability is rapid in the upper part of the solum, moderately rapid in the lower part of the solum, and very rapid in the substratum. Slopes range from 1 to 4 percent.

Ormas soils are similar to Elston Variant soils and

Onarga soils and are adjacent to Glenhall and Seafield soils on the landscape. Elston Variant soils have less sand in the upper part of the solum than the Ormas soils and have a dark surface layer. Onarga soils have more clay in the surface layer than the Ormas soils. Glenhall soils have more clay and less sand in the solum than the Ormas soils. They are in the slightly lower positions. Seafield soils are more gray in the subsoil than the Ormas soils. They are in the lower positions on the landscape.

Typical pedon of Ormas loamy sand, sandy substratum, 1 to 4 percent slopes, in a cultivated field; 800 feet west and 1,900 feet south of the northeast corner of sec. 2, T. 27 N., R. 10 W.

Ap—0 to 10 inches; dark brown (10YR 4/3) loamy sand, pale brown (10YR 6/3) dry; weak fine granular structure; very friable; many very fine roots; slightly acid; clear wavy boundary.

E—10 to 24 inches; brown (10YR 5/3) loamy sand; single grain; loose; common very fine roots; slightly acid; gradual wavy boundary.

2Bt—24 to 45 inches; brown (7.5YR 5/4) gravelly sandy loam; moderate medium subangular blocky structure; friable; thin dark brown (7.5YR 4/4) clay bridges between sand grains; 20 percent gravel; neutral; clear wavy boundary.

2C 45 to 60 inches; pale brown (10YR 6/3) loamy sand; single grain; loose; thin strata of coarse sand totaling 4 inches; 10 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 45 to 60 inches. The Ap and E horizons have hue of 10YR, value of 3 to 6, and chroma of 2 to 4. They are medium acid to neutral. The 2Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8. It ranges from strongly acid to neutral. The 2C horizon has hue of 10YR, value of 5 or 6, and chroma of 3 to 6. It is loamy sand or sand. It is mildly alkaline or moderately alkaline.

Papineau Series

The Papineau series consists of very deep, somewhat poorly drained soils on lake plains and recessional moraines. These soils formed in loamy outwash and in the underlying clayey lacustrine deposits or glacial till. Permeability is moderate in the loamy layers and slow in the lower clayey part. Slopes range from 0 to 3 percent.

Papineau soils are similar to Strole, Swygert, and Wesley soils and are adjacent to Bryce, Iroquois, and Simonin soils on the landscape. Strole and Swygert soils have more clay in the upper part of the solum than the Papineau soils, and Simonin soils are browner in the subsoil. Simonin and Wesley soils contain more sand in the upper part of the solum than the Papineau soils. Simonin soils are in the higher positions on the landscape. Bryce and Iroquois soils are grayer in the upper part of the subsoil than the Papineau soils. They are in the lower positions on the landscape.

Typical pedon of Papineau fine sandy loam, 0 to 1 percent slopes, in a cultivated field; 800 feet west and 200 feet north of the southeast corner of sec. 7, T. 28 N., R. 8 W.

Ap—0 to 10 inches; very dark gray (10YR 3/1) fine sandy loam, dark grayish brown (10YR 4/2) dry; weak medium granular structure; friable; few fine roots; medium acid; abrupt smooth boundary.

Bt1—10 to 20 inches; yellowish brown (10YR 5/4) clay loam; common fine distinct gray (10YR 6/1) mottles; weak fine subangular blocky structure; friable; few fine roots; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; slightly acid; clear wavy boundary.

Bt2—20 to 37 inches; brown (10YR 5/3) clay loam; common medium faint yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; friable; thin discontinuous gray (10YR 5/1) clay films on faces of peds; slightly acid; abrupt wavy boundary.

2Bt3—37 to 43 inches; yellowish brown (10YR 5/4) silty clay; many coarse distinct light brownish gray (10YR 6/2) mottles; moderate medium prismatic structure parting to moderate fine angular blocky; firm; medium discontinuous gray (10YR 5/1) clay films on faces of prisms and peds; slight effervescence; mildly alkaline; clear wavy boundary.

2C—43 to 60 inches; brown (10YR 5/3) silty clay; many medium distinct gray (10YR 6/1) mottles; massive; very firm; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 36 to 48 inches. The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is sandy loam or fine sandy loam. The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. It is clay loam or sandy clay loam. It is medium acid to neutral. The 2Bt horizon has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 2 to 4. It is neutral to moderately alkaline. The 2C horizon has hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 1 to 4. It is mildly alkaline or moderately alkaline.

Peotone Series

The Peotone series consists of very deep, very poorly drained soils in potholes on ground moraines and recessional moraines. These soils formed in local

colluvium. Permeability is slow in the upper part and moderately slow in the lower part. Slopes range from 0 to 2 percent.

Peotone soils are similar to Wallkill and Wallkill Variant soils and are adjacent to Montmorenci soils on the landscape. Wallkill soils contain less clay in the solum than the Peotone soils, and Wallkill Variant soils have a thinner surface soil. Wallkill and Wallkill Variant soils are underlain by organic deposits. Montmorenci soils have less clay in the solum than the Peotone soils and are browner in the subsoil. They are in the higher positions on the landscape.

Typical pedon of Peotone silty clay loam, pothole, in a cultivated field; 460 feet west and 2,240 feet south of the northeast corner of sec. 34, T. 29 N., R. 8 W.

Ap—0 to 11 inches; black (N 2/0) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; many very fine roots; neutral; abrupt wavy boundary.

A—11 to 34 inches; black (10YR 2/1) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure; friable; many very fine roots; neutral; clear wavy boundary.

Bg—34 to 46 inches; dark gray (5Y 4/1) silty clay loam; common medium prominent yellowish brown (10YR 5/8) mottles; moderate fine prismatic structure parting to moderate fine subangular blocky; firm; neutral; clear wavy boundary.

BCg—46 to 51 inches; olive gray (5Y 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; common white (10YR 8/1) calcium carbonate coatings; common white (10YR 8/1) shell fragments; strong effervescence; mildly alkaline; clear wavy boundary.

Cg—51 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium prominent yellowish red (5YR 4/6) mottles; massive; firm; common white (10YR 8/1) shell fragments; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the mollic epipedon ranges from 24 to 36 inches. The Ap and A horizons have hue of 10YR, value of 2 or 3, and chroma of 1, or they are neutral in hue and have value of 2 or 3. The Bg horizon has hue of 10YR, 2.5Y, or 5Y or is neutral in hue. It has value of 4 to 6 and chroma of 0 to 2. It is silty clay loam or silty clay. It slightly acid to mildly alkaline. The BCg horizon has hue of 10YR, 2.5Y, or 5Y or is neutral in hue. It has value of 5 or 6 and chroma of 0 to 2. It is silt loam or silty clay loam. It is neutral or mildly alkaline. The Cg horizon has hue of 10YR, 2.5Y, or 5Y or is neutral in hue. It has value of 5 or 6 and chroma of 0 to 2. It is mainly silty clay loam, but the range includes silt loam in some pedons. This horizon is neutral to moderately alkaline.

Prochaska Series

The Prochaska series consists of very deep, very poorly drained, rapidly permeable soils on flood plains. These soils formed in sandy alluvial sediments. Slopes range from 0 to 2 percent.

Prochaska soils are similar to Comfrey, Craigmile, and Sawabash soils and are adjacent to Algansee soils on the landscape. Comfrey and Sawabash soils have more clay throughout than the Prochaska soils. Craigmile soils have more clay in the upper part of the profile than the Prochaska soils. Algansee soils are browner in the upper part of the subsoil than the Prochaska soils. They are in the slightly higher positions on the landscape.

Typical pedon of Prochaska loamy sand, frequently flooded, in a cultivated field; 400 feet south and 600 feet east of the northwest corner of sec. 10, T. 31 N., R. 9 W.

Ap—0 to 9 inches; black (10YR 2/1) loamy sand, dark gray (10YR 4/1) dry; weak medium granular structure; very friable; many fine and medium roots; medium acid; abrupt smooth boundary.

A1—9 to 12 inches; black (10YR 2/1) loamy sand, gray (10YR 5/1) dry; weak medium subangular blocky structure; very friable; many fine and medium roots; medium acid; clear wavy boundary.

A2—12 to 19 inches; black (10YR 2/1) loamy sand, gray (10YR 5/1) dry; weak medium subangular blocky structure; very friable; common fine and very fine roots; few accumulations of light gray (10YR 6/1) sand grains; slightly acid; gradual wavy boundary.

Bg1—19 to 24 inches; dark gray (10YR 4/1) loamy sand; few fine distinct brown (10YR 4/3) mottles; weak medium subangular blocky structure; very friable; few very fine roots; common very dark gray (10YR 3/1) organic streaks; few accumulations of light gray (10YR 6/1) sand grains; slightly acid; clear wavy boundary.

Bg2—24 to 28 inches; black (10YR 2/1) loamy sand; weak medium subangular blocky structure; very friable; few grayish brown (10YR 5/2) strata; few accumulations of light gray (10YR 6/1) sand grains; slightly acid; clear wavy boundary.

Bg3—28 to 33 inches; grayish brown (10YR 5/2) loamy sand; common fine distinct yellowish brown (10YR 5/4) mottles; weak coarse subangular blocky structure; very friable; common very dark gray (10YR 3/1) organic streaks; few accumulations of

light gray (10YR 6/1) sand grains; neutral; clear wavy boundary.

Cg1—33 to 42 inches; grayish brown (10YR 5/2) sand; common coarse distinct yellowish red (5YR 5/8) mottles; single grain; loose; common accumulations of light gray (10YR 6/1) sand grains; neutral; clear wavy boundary.

Cg2—42 to 60 inches; gray (10YR 5/1) sand; common medium distinct yellowish red (5YR 5/8) mottles; single grain; loose; common accumulations of light gray (10YR 6/1) sand grains; neutral.

The thickness of the solum ranges from 20 to 36 inches. The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is loamy sand, sand, or loamy fine sand. The Bg horizon has hue of 10YR, value of 2 to 6, and chroma of 1 or 2. It is sand, loamy sand, or loamy fine sand. It is medium acid to neutral. The C horizon has hue of 10YR, value of 5 or 6, and chroma of 1 to 3. It is sand or loamy sand. It is medium acid to neutral.

Ridgeville Series

The Ridgeville series consists of very deep, somewhat poorly drained soils on outwash plains and moraines. These soils formed in loamy outwash. Permeability is moderate in the upper part of the solum and moderately rapid in the lower part of the solum and in the substratum. In the till substratum phase, permeability is moderately slow in the underlying till. Slopes range from 0 to 2 percent.

Ridgeville soils are adjacent to Ayr, Ayrmount, Gilford, Odell, Onarga, and Sumava soils on the landscape. Ayr and Ayrmount soils are less gray in the upper part of the subsoil than the Ridgeville soils and have less clay in the upper part of the solum. Also, they are higher on the landscape. Gilford soils are grayer in the upper part of the subsoil than the Ridgeville soils. They are in the lower positions on the landscape. Odell and Onarga soils are in the higher positions. Odell soils have less sand in the upper part of the subsoil than the Ridgeville soils. Onarga soils are browner in the subsoil than the Ridgeville soils. Sumava soils have less sand in the lower part of the subsoil than the Ridgeville soils. They are in the slightly higher positions.

Typical pedon of Ridgeville fine sandy loam, 0 to 2 percent slopes, in a field; 1,900 feet east and 400 feet south of the center of sec. 25, T. 29 N., R. 10 W.

Ap—0 to 10 inches; very dark brown (10YR 2/2) fine sandy loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; very friable; common fine roots; slightly acid; abrupt smooth boundary.

BA—10 to 21 inches; dark brown (10YR 4/3) fine sandy loam; common medium distinct grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; very friable; few fine roots; slightly acid; gradual wavy boundary.

Bt -21 to 38 inches; yellowish brown (10YR 5/4) fine sandy loam; common medium distinct grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; very friable; few fine roots; thin discontinuous gray (10YR 5/1) clay films on faces of peds; medium acid; clear wavy boundary.

Btg—38 to 40 inches; light brownish gray (10YR 6/2) fine sandy loam; common medium distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; very friable; thin discontinuous gray (10YR 5/1) clay films on faces of peds; medium acid; clear wavy boundary.

C—40 to 45 inches; yellowish brown (10YR 5/8) fine sand; common medium distinct pale brown (10YR 6/3) mottles; single grain; loose; thin yellowish brown (10YR 5/8) strata of sandy loam totaling 1 inch; thin discontinuous lenses of pale brown (10YR 6/3) loamy fine sand; neutral; clear wavy boundary.

Cg—45 to 60 inches; light brownish gray (10YR 6/2) fine sand; common medium distinct yellowish brown (10YR 5/6) mottles; single grain; loose; thin light brownish gray (10YR 6/2) strata of fine sandy loam totaling 3 inches; neutral.

The thickness of the solum ranges from 35 to 50 inches. The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The upper part of the Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. The lower part has hue of 10YR, value of 5 or 6, and chroma of 2 to 6. The Bt horizon is fine sandy loam or sandy loam. It is medium acid to neutral. The C horizon has hue of 10YR, value of 5 or 6, and chroma of 2 to 8. It is fine sand or loamy sand and has strata of finer textures. It is neutral or mildly alkaline. A till substratum phase of this series is recognized. Reaction is mildly alkaline or moderately alkaline in the glacial till.

Ross Series

The Ross series consists of very deep, well drained, moderately permeable soils on flood plains. These soils formed in loamy alluvium. Slopes range from 0 to 2 percent.

Ross soils are adjacent to Martinsville and Sawabash soils on the landscape. Martinsville soils have a light colored surface layer and are on adjacent slopes. Sawabash soils are grayer than the Ross soils and have less sand and more silt in the profile. They are in the lower lying areas.

Typical pedon of Ross silt loam, frequently flooded, in a cultivated field; 1,100 feet east and 800 feet north of the southwest corner of sec. 34, T. 28 N., R. 9 W.

Ap—0 to 9 inches; black (10YR 2/1) silt loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; many very fine roots; mildly alkaline; abrupt smooth boundary.

A—9 to 16 inches; very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; weak coarse granular structure; friable; many very fine roots; mildly alkaline; gradual wavy boundary.

Bw1—16 to 30 inches; dark brown (10YR 3/3) silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; friable; common very fine roots; common very dark brown (10YR 2/2) organic films on faces of peds; mildly alkaline; gradual wavy boundary.

Bw2—30 to 39 inches; brown (10YR 4/3) loam; weak fine subangular blocky structure; friable; few very fine roots; common very dark grayish brown (10YR 3/2) organic films on faces of peds; mildly alkaline; gradual wavy boundary.

C1—39 to 46 inches; dark brown (10YR 4/3) loam; massive; friable; mildly alkaline; clear wavy boundary.

C2—46 to 60 inches; brown (10YR 4/3) very fine sandy loam; massive; friable; slight effervescence; mildly alkaline.

The thickness of the solum ranges from 24 to 45 inches. The thickness of the mollic epipedon ranges from 24 to 40 inches. The Ap and A horizons have hue of 10YR, value of 2 or 3, and chroma of 1 to 3. They are silt loam or loam and have 0 to 3 percent gravel. The Bw horizon has hue of 10YR and value and chroma of 3 or 4. It has 0 to 5 percent gravel. It is slightly acid to moderately alkaline. The C horizon has hue of 10YR, value of 4, and chroma of 2 to 4. It is slightly acid to moderately alkaline.

Sawabash Series

The Sawabash series consists of very deep, very poorly drained, moderately permeable soils on flood plains. These soils formed in silty and loamy alluvium. Slopes range from 0 to 2 percent.

Sawabash soils are similar to Comfrey, Craigmile, and Prochaska soils and are adjacent to Martinsville, Miami, and Ross soils on the landscape. Comfrey and Ross soils have less silt and more sand in the profile than the Sawabash soils. Also, Ross soils are browner in the profile. They are in the slightly higher lying areas. Craigmile and Prochaska soils have less clay and more sand in the profile than the Sawabash soils, and Martinsville and Miami soils are browner in the profile. They are on adjacent slopes.

Typical pedon of Sawabash silty clay loam, frequently flooded, undrained, in a wooded area; 225 feet west and 2,200 feet south of the northeast corner of sec. 20, T. 28 N., R. 8 W.

A1—0 to 6 inches; black (10YR 2/1) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; friable; many fine and very fine roots; slight effervescence; moderately alkaline; clear wavy boundary.

A2—6 to 12 inches; black (N 2/0) silty clay loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; many fine and very fine roots; slight effervescence; moderately alkaline; gradual wavy boundary.

A3—12 to 20 inches; black (N 2/0) silty clay loam, dark gray (10YR 4/1) dry; moderate medium granular structure; friable; common very fine roots; slight effervescence; moderately alkaline; gradual wavy boundary.

A4—20 to 27 inches; black (10YR 2/1) silty clay loam, dark grayish brown (10YR 4/2) dry; few fine distinct yellowish brown (10YR 5/8) mottles; moderate fine subangular blocky structure; friable; slight effervescence; moderately alkaline; gradual wavy boundary.

A5—27 to 35 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; few fine distinct strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; friable; slight effervescence; moderately alkaline; gradual wavy boundary.

Cg1—35 to 46 inches; gray (10YR 5/1) silty clay loam; common fine distinct light brownish gray (10YR 6/1) mottles; massive; friable; slight effervescence; moderately alkaline; clear wavy boundary.

Cg2—46 to 60 inches; grayish brown (10YR 5/2) silt loam; common fine faint light brownish gray (10YR 6/2) mottles; massive; friable; slight effervescence; moderately alkaline.

The thickness of the mollic epipedon ranges from 24 to 36 inches. Reaction is mildly alkaline or moderately alkaline throughout the profile. The A horizon has hue of 10YR, 5Y, or 2.5Y, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2 or 3. It is silt loam or silty clay loam. The C horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 or 5, and chroma of 1 to 3.

Seafield Series

The Seafield series consists of very deep, somewhat

poorly drained soils on outwash plains. These soils formed in sandy outwash materials. Permeability is moderately rapid in the solum and rapid in the substratum. Slopes range from 0 to 2 percent.

Seafield soils are similar to Whitaker soils and are adjacent to Brems, Gilford, and Ormas soils on the landscape. Whitaker soils have more clay in the subsoil than the Seafield soils. Brems and Ormas soils are less gray in the upper part of the subsoil than the Seafield soils. They are in the slightly higher positions on the landscape. Gilford soils are grayer in the upper part of the subsoil than the Seafield soils. They are in the lower positions.

Typical pedon of Seafield fine sandy loam, 0 to 2 percent slopes, in a cultivated field; 1,000 feet south and 1,800 feet east of the northwest corner of sec. 3, T. 29 N., R. 8 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) fine sandy loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; common very fine and fine roots; slightly acid; abrupt smooth boundary.

Bt—8 to 14 inches; brown (10YR 5/3) fine sandy loam; few medium distinct light brownish gray (10YR 6/2) mottles; weak coarse subangular blocky structure; friable; few very fine roots; thin discontinuous gray (10YR 5/1) clay bridges between sand grains; medium acid; clear wavy boundary.

Btg1—14 to 27 inches; gray (10YR 5/1) fine sandy loam; many medium distinct brownish yellow (10YR 6/8) mottles; weak coarse subangular blocky structure; friable; few very fine roots; thin light gray (10YR 6/1) clay bridges between sand grains; medium acid; clear wavy boundary.

Btg2—27 to 31 inches; light brownish gray (10YR 6/2) sandy clay loam; common medium distinct brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; firm; thin discontinuous light gray (10YR 6/1) clay films on faces of peds; medium acid; clear wavy boundary.

Cg1—31 to 45 inches; light brownish gray (10YR 6/2) fine sand; common medium distinct yellowish brown (10YR 5/6) mottles; single grain; loose; slightly acid; gradual wavy boundary.

Cg2—45 to 60 inches; light gray (10YR 6/1) fine sand; few medium distinct yellowish brown (10YR 5/6) mottles; single grain; loose; slightly acid.

The thickness of the solum ranges from 20 to 35 inches. The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The B horizon has hue of 10YR, value of 5 or 6, and chroma of 1 to 4. It is fine sandy loam, sandy loam, or sandy clay loam. The Cg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. It is sand or fine sand. It is medium acid to neutral.

Selma Series

The Selma series consists of very deep, poorly drained soils on outwash plains, recessional moraines, and ground moraines. These soils formed in loamy outwash deposits. Permeability is moderate in the solum and moderately rapid in the substratum. In the sandy substratum phase, permeability is rapid in the substratum. In the till substratum phase, it is slow or moderately slow in the lower part of the substratum. Slopes range from 0 to 2 percent.

Selma soils are adjacent to Barce, Darroch, and Foresman soils on the landscape. Barce, Darroch, and Foresman soils are browner in the upper part of the subsoil than the Selma soils. They are in the higher positions on the landscape.

Typical pedon of Selma silt loam, in a cultivated field; 2,200 feet east and 100 feet south of the northwest corner of sec. 33, T. 28 N., R. 9 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak medium granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

A—9 to 15 inches; very dark grayish brown (10YR 3/2) silt loam, gray (10YR 5/1) dry; weak fine subangular blocky structure; friable; common very fine roots; slightly acid; clear wavy boundary.

Btg1—15 to 25 inches; dark grayish brown (10YR 4/2) loam; common medium distinct gray (10YR 5/1) and many fine distinct yellowish brown (10YR 5/4) mottles; moderate medium prismatic structure parting to moderate fine subangular blocky; friable; few very fine roots; thin continuous very dark gray (10YR 3/1) organic clay films on faces of prisms and peds; neutral; clear wavy boundary.

Btg2—25 to 38 inches; grayish brown (10YR 5/2) clay loam; common medium distinct gray (10YR 6/1) and many fine distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate fine subangular blocky; friable; thin continuous dark gray (10YR 4/1) clay films on faces of prisms and peds; neutral; clear wavy boundary.

BCtg—38 to 45 inches; light brownish gray (10YR 6/2) loam; common medium faint gray (10YR 6/1) and common fine distinct yellowish brown (10YR 5/8) mottles; moderate medium prismatic structure parting to weak medium subangular blocky; friable; thin patchy light brownish gray (10YR 6/2) clay films

on faces of prisms and peds; neutral; clear wavy boundary.

Cg—45 to 60 inches; light brownish gray (10YR 6/2) silt loam; common medium faint light gray (10YR 6/1) and common fine distinct yellowish brown (10YR 5/8) mottles; massive; friable; thin strata of yellowish brown (10YR 5/4) sandy loam and loamy sand totaling 8 inches; slight effervescence; mildly alkaline.

The thickness of the solum ranges from 35 to 50 inches. The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is loam, silt loam, fine sandy loam, or silty clay loam. The Btg horizon has hue of 10YR, 5Y, or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is loam or clay loam. It is slightly acid or neutral. The C horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 to 4. It is stratified and dominantly has textures of silt loam to sandy loam, but sandy textures are included. It is mildly alkaline or moderately alkaline.

Simonin Series

The Simonin series consists of very deep, moderately well drained soils on lake plains. These soils formed in sandy and loamy outwash and in the underlying clayey lacustrine sediments. Permeability is rapid in the upper part of the solum, moderately rapid in the next part, and slow in the lower part of the solum and in the substratum. Slopes range from 1 to 15 percent.

Simonin soils are similar to Ayr and Ayrmount soils and are adjacent to Iroquois, Montgomery, Papineau, and Wesley soils on the landscape. Ayr and Ayrmount soils have less clay in the lower part of the solum than the Simonin soils. Iroquois and Montgomery soils are grayer throughout than the Simonin soils and have less sand in the upper part of the solum. Papineau and Wesley soils have less sand in the upper part of the solum than the Simonin soils and are grayer in the subsoil. Also, they are slightly lower on the landscape.

Typical pedon of Simonin loamy sand, 1 to 3 percent slopes, in a cultivated field; 200 feet west and 700 feet north of the southeast corner of sec. 25, T. 28 N., R. 8 W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) loamy sand, grayish brown (10YR 5/2) dry; weak medium granular structure; very friable; common fine roots; neutral; abrupt smooth boundary.

Bw—10 to 28 inches; yellowish brown (10YR 5/6) sand; weak medium granular structure; very friable; few very fine roots; neutral; clear wavy boundary.

Bt1—28 to 34 inches; yellowish brown (10YR 5/4) sandy loam; common medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; slightly acid; abrupt wavy boundary.

2Bt2—34 to 39 inches; yellowish brown (10YR 5/4) silty clay; common medium distinct light brownish gray (10YR 6/2) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; neutral; clear wavy boundary.

2C—39 to 60 inches; yellowish brown (10YR 5/4) silty clay; common medium distinct gray (10YR 6/1) mottles; massive; very firm; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 40 inches. The combined thickness of the sandy layers in the upper part is 20 to 28 inches. The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is fine sandy loam or sandy loam. It is medium acid or slightly acid. The 2Bt horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4. It is silty clay or clay. It is slightly acid or neutral. The 2C horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is clay or silty clay. It is mildly alkaline or moderately alkaline.

Sparta Series

The Sparta series consists of very deep, excessively drained, rapidly permeable soils on recessional moraines and outwash plains. These soils formed in sandy sediments. Slopes range from 1 to 4 percent.

Sparta soils are similar to Oakville soils and are adjacent to Ayr, Nesius, and Watseka soils on the landscape. Ayr soils have more clay and less sand in the lower part of the solum than the Sparta soils. They are in landscape positions similar to those of the Sparta soils. Nesius and Watseka soils have gray mottles in the subsoil. They are in the lower positions on the landscape.

Typical pedon of Sparta loamy fine sand, 1 to 4 percent slopes, in a cultivated field; 100 feet north and 2,400 feet west of the southeast corner of sec. 26, T. 29 N., R. 8 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loamy fine sand, dark grayish brown (10YR 4/2) dry; weak coarse granular structure; very friable; many medium and fine roots; slightly acid; abrupt smooth boundary.

A—9 to 14 inches; dark brown (10YR 3/3) fine sand, grayish brown (10YR 5/2) dry; weak fine granular structure; very friable; common medium and fine roots; slightly acid; clear wavy boundary.

Bw—14 to 31 inches; yellowish brown (10YR 5/6) fine sand; weak fine granular structure; very friable; few medium and fine roots; slightly acid; gradual wavy boundary.

C—31 to 60 inches; yellowish brown (10YR 5/4) fine sand; single grain; loose; medium acid.

The thickness of the solum ranges from 24 to 40 inches. The solum is sand, fine sand, loamy fine sand, or loamy sand. The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. The Bw horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. It is strongly acid to slightly acid. The C horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. It is sand or fine sand.

Strole Series

The Strole series consists of very deep, somewhat poorly drained, slowly permeable soils on lake plains. These soils formed in clayey lacustrine sediments. Slopes are 0 to 1 percent.

Strole soils are similar to Papineau, Swygert, and Wesley soils and are adjacent to Iroquois and Montgomery soils on the landscape. Iroquois and Papineau soils contain less clay in the upper part of the solum than the Strole soils, and Swygert soils have less illite clay throughout. Wesley soils have more sand in the upper part of the solum than the Strole soils. Iroquois and Montgomery soils are grayer in the upper part of the subsoil than the Strole soils. They are in the lower positions on the landscape.

Typical pedon of Strole silty clay loam, 0 to 1 percent slopes, in a cultivated field; 200 feet east and 200 feet south of the northwest corner of sec. 24, T. 28 N., R. 8 W.

Ap—0 to 6 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; moderate medium granular structure; firm; many medium and fine roots; neutral; abrupt smooth boundary.

A—6 to 12 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; strong medium angular blocky structure; firm; common medium and fine roots; neutral; clear wavy boundary.

Bt1—12 to 16 inches; yellowish brown (10YR 5/4) silty clay; common medium distinct gray (10YR 5/1) mottles; moderate medium prismatic structure parting to strong medium angular blocky; firm; common fine roots; thin discontinuous dark gray (10YR 4/1) clay films on faces of prisms and peds; neutral; clear wavy boundary.

Bt2—16 to 30 inches; brown (10YR 5/3) silty clay; common fine distinct gray (5Y 5/1) and yellowish brown (10YR 5/8) mottles; moderate medium prismatic structure parting to strong medium angular blocky; very firm; few very fine roots; thin discontinuous dark gray (10YR 4/1) clay films on faces of prisms and peds; slight effervescence; mildly alkaline; gradual wavy boundary.

C—30 to 60 inches; brown (10YR 5/3) silty clay; common medium distinct yellowish brown (10YR 5/8) and gray (10YR 6/1) mottles; massive; very firm; common white (10YR 8/1) calcium carbonate coatings on internal planes; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 40 inches. The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is silty clay loam or silt loam. The Bt horizon has hue of 10YR, 5Y, or 2.5Y, value of 3 to 5, and chroma of 2 to 4. It is clay or silty clay. It is medium acid to neutral in the upper part and medium acid to mildly alkaline in the lower part. The C horizon has hue of 10YR, 5Y, or 2.5Y, value of 4 to 6, and chroma of 1 to 3. It is silty clay or clay. It is mildly alkaline or moderately alkaline.

Sumava Series

The Sumava series consists of very deep, somewhat poorly drained soils on recessional moraines. These soils formed in loamy outwash deposits and in the underlying glacial till. Permeability is moderately rapid in the upper part of the solum and moderate in the lower part of the solum and in the substratum. Slopes range from 0 to 2 percent.

Sumava soils are adjacent to Barry, Octagon, Odell, and Ridgeville soils on the landscape. Barry soils have more clay in the subsoil than the Sumava soils and are grayer in the upper part of the subsoil. They are in depressional areas. Octagon soils are browner in the subsoil than the Sumava soils. They are in the higher positions on the landscape. Odell soils have less sand and more clay in the subsoil than the Sumava soils. They are in the slightly higher positions. Ridgeville soils have more sand in the lower part of the subsoil than the Sumava soils. They are in the lower positions.

Typical pedon of Sumava fine sandy loam, in an area of Sumava-Ridgeville-Odell complex, 0 to 2 percent slopes, in a cultivated field; 500 feet west and 200 feet north of the southeast corner of sec. 17, T. 29 N., R. 8 W.

Ap—0 to 10 inches; very dark gray (10YR 3/1) fine

sandy loam, dark grayish brown (10YR 4/2) dry; weak medium granular structure; very friable; few fine roots; neutral; abrupt smooth boundary.

Bt1—10 to 17 inches; light olive brown (2.5Y 5/4) fine sandy loam; few fine faint grayish brown (2.5Y 5/2) mottles; weak medium subangular blocky structure; friable; few fine roots; thin discontinuous very dark gray (10YR 3/1) organic coatings on faces of peds; thin patchy dark grayish brown (10YR 4/2) clay films on faces of peds; neutral; clear wavy boundary.

Bt2—17 to 22 inches; yellowish brown (10YR 5/4) fine sandy loam; common medium distinct brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; friable; thin patchy very dark gray (10YR 3/1) organic coatings on faces of peds; thin patchy dark grayish brown (10YR 4/2) clay films on faces of peds; neutral; clear wavy boundary.

Bt3—22 to 29 inches; yellowish brown (10YR 5/4) fine sandy loam; few medium distinct brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; friable; thin discontinuous gray (10YR 5/1) clay films on faces of peds; neutral; clear wavy boundary.

BC1—29 to 36 inches; pale brown (10YR 6/3) fine sandy loam; many fine faint grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; very friable; mildly alkaline; clear wavy boundary.

2BC2—36 to 39 inches; yellowish brown (10YR 5/4) loam; common medium distinct brownish yellow (10YR 6/6) and light gray (10YR 6/1) mottles; weak coarse subangular blocky structure; friable; slight effervescence; mildly alkaline; gradual wavy boundary.

2C—39 to 60 inches; yellowish brown (10YR 5/4) loam; common medium distinct brownish yellow (10YR 6/6) and light gray (10YR 6/1) mottles; massive; friable; common white (10YR 8/1) calcium carbonate coatings on horizontal and vertical fracture faces; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 20 to 40 inches. The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 6. The 2C horizon has hue of 10YR, value of 4 to 6, and chroma of 3 or 4. It is mildly alkaline or moderately alkaline.

Swygert Series

The Swygert series consists of very deep, somewhat poorly drained soils on recessional moraines. These soils formed in clayey glacial till. Permeability is moderate and moderately slow in the upper part of the solum, slow in the lower part of the solum, and very slow in the substratum. Slopes range from 0 to 2 percent.

Swygert soils are similar to Papineau, Strole, and Wesley soils and are adjacent to Bryce and Simonin soils on the landscape. Strole soils have more illite in the profile than the Swygert soils, and Papineau and Wesley soils have more sand in the upper part of the solum. Bryce soils are grayer in the upper part of the subsoil than the Swygert soils. They are in depressional areas. Simonin soils have less clay in the upper part of the solum than the Swygert soils and are browner in the subsoil. They are in the higher positions on the landscape.

Typical pedon of Swygert silt loam, 0 to 2 percent slopes, in a cultivated field; 200 feet east and 200 feet north of the southwest corner of sec. 31, T. 29 N., R. 8 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; many fine and very fine roots; neutral; abrupt smooth boundary.

A—8 to 12 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure; friable; many fine and very fine roots; neutral; clear wavy boundary.

Bt1—12 to 19 inches; dark brown (10YR 4/3) silty clay; common medium distinct gray (10YR 5/1) mottles; strong medium angular blocky structure; firm; many fine and very fine roots; thin discontinuous dark gray (10YR 4/1) clay films on faces of peds; neutral; clear wavy boundary.

Bt2—19 to 27 inches; brown (10YR 5/3) silty clay; many coarse distinct yellowish brown (10YR 5/8) mottles; moderate medium prismatic structure parting to strong medium angular blocky; firm; common very fine roots; thin continuous gray (5Y 5/1) clay films on faces of prisms and peds; neutral; clear wavy boundary.

Btg1—27 to 37 inches; olive gray (5Y 5/2) silty clay; common coarse prominent strong brown (7.5YR 5/8) mottles; strong medium prismatic structure parting to strong coarse angular blocky; very firm; few very fine roots; thin continuous gray (5YR 6/1) clay films on faces of prisms and peds; slight effervescence; mildly alkaline; clear wavy boundary.

Btg2—37 to 42 inches; light olive gray (5Y 6/2) silty clay; common medium prominent strong brown (7.5YR 5/8) mottles; weak medium prismatic structure parting to moderate coarse angular blocky;

very firm; few very fine roots; thin discontinuous gray (5Y 6/1) clay films on faces of prisms and peds; few very fine roots; strong effervescence; moderately alkaline; clear wavy boundary.

Cdg—42 to 60 inches; gray (5Y 6/1) silty clay; common medium prominent strong brown (7.5YR 5/6) mottles; massive; very firm; common white (10YR 8/1) calcium carbonate accumulations; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 35 to 50 inches. The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The Bt horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 or 5, and chroma of 2 to 6. The Btg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 to 4. The Cd horizon has hue of 2.5Y, value of 5 or 6, and chroma of 1 to 4. It is silty clay or silty clay loam.

Swygert Variant

The Swygert Variant consists of very deep, moderately well drained soils on recessional moraines. These soils formed in clayey glacial till. Permeability is moderately slow in the upper part of the solum and slow in the lower part of the solum and in the substratum. Slopes range from 2 to 15 percent.

Swygert Variant soils are adjacent to Bryce, Papineau, and Simonin soils on the landscape. Bryce and Papineau soils are grayer in the subsoil than the Swygert Variant soils. They are in the lower lying areas. Simonin soils have less clay in the upper part of the solum than the Swygert Variant soils and have a thicker surface layer. They are in the slightly lower positions on the landscape.

Typical pedon of Swygert Variant loam, in an area of Swygert Variant-Simonin complex, 2 to 6 percent slopes, eroded, in a cultivated field; 200 feet west and 2,500 feet north of the southeast corner of sec. 29, T. 29 N., R. 8 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; mixed with yellowish brown (10YR 5/6) silty clay loam from the subsoil; moderate medium granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

Bt1—8 to 16 inches; yellowish brown (10YR 5/6) silty clay loam; strong medium subangular blocky structure; firm; common fine roots; thin continuous yellowish brown (10YR 5/4) clay films on faces of peds; many very dark grayish brown (10YR 3/2) organic stains in root channels and on faces of peds; neutral; clear wavy boundary.

Bt2—16 to 24 inches; yellowish brown (10YR 5/4) silty clay; few medium distinct pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; firm; few very fine roots; thin continuous brown (10YR 4/3) clay films on faces of peds; neutral; clear wavy boundary.

Bt3—24 to 32 inches; yellowish brown (10YR 5/4) silty clay; few fine distinct light brownish gray (10YR 6/2) and common medium distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; firm; thin discontinuous grayish brown (10YR 5/2) clay films on faces of peds; slight effervescence; mildly alkaline; clear wavy boundary.

BCt—32 to 39 inches; yellowish brown (10YR 5/4) silty clay; common medium distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; very firm; thin patchy gray (10YR 5/1) clay films on faces of peds; few light gray (10YR 7/1) accumulations of calcium carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

Cd—39 to 60 inches; light olive brown (2.5Y 5/4) silty clay; common medium distinct yellowish brown (10YR 5/8) and gray (10YR 5/1) mottles; massive; very firm; few light gray (10YR 7/1) accumulations of calcium carbonate; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 25 to 45 inches. The Ap horizon has hue of 10YR, value of 3, and chroma of 1 to 3. The Bt horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 to 6. It is slightly acid or neutral in the upper part and neutral or mildly alkaline in the lower part. The Cd horizon has hue of 2.5Y, value of 5 or 6, and chroma of 2 to 4. It is mildly alkaline or moderately alkaline.

Tedrow Series

The Tedrow series consists of very deep, somewhat poorly drained, rapidly permeable soils on old lake beds on outwash plains. These soils formed in sandy sediments. Slopes range from 0 to 2 percent.

Tedrow soils are similar to Algansee, Morocco, Watseka, and Zaborosky soils and are adjacent to Conrad and Kentland soils on the landscape. Algansee soils have an irregular decrease in organic carbon with increasing depth. Morocco soils are more acid than the Tedrow soils. Watseka soils have a thicker dark surface layer than the Tedrow soils. Zaborosky soils have a buried A horizon. Conrad and Kentland soils are grayer in the upper part of the subsoil than the Tedrow soils. They are in the lower lying positions.

Typical pedon of Tedrow loamy fine sand, 0 to 2 percent slopes, in a cultivated field; 700 feet north and

150 feet west of the southeast corner of sec. 16, T. 30 N., R. 9 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loamy fine sand, pale brown (10YR 6/3) dry; weak fine granular structure; very friable; common fine roots; neutral; abrupt smooth boundary.

Bw1—9 to 14 inches; dark brown (10YR 4/3) sand; weak fine granular structure; very friable; common fine roots; neutral; clear wavy boundary.

Bw2—14 to 18 inches; pale brown (10YR 6/3) sand; few medium faint light brownish gray (10YR 6/2) mottles; weak fine granular structure; very friable; few fine roots; neutral; clear wavy boundary.

Bw3—18 to 29 inches; pale brown (10YR 6/3) sand; common medium faint light brownish gray (10YR 6/2) and common coarse distinct yellowish red (5YR 5/8) mottles; weak fine granular structure; very friable; mildly alkaline; clear wavy boundary.

Cg—29 to 60 inches; light brownish gray (10YR 6/2) sand; common medium distinct yellowish brown (10YR 5/6) mottles; single grain; loose; strong effervescence; moderately alkaline.

The thickness of the solum and the depth to carbonates range from 24 to 40 inches. The Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 2 or 3. It is loamy sand or loamy fine sand. The Bw horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. It is sand or fine sand. It is medium acid to mildly alkaline. The C horizon has hue of 10YR, value of 5 or 6, and chroma of 2 to 4. It is sand or fine sand. It is mildly alkaline or moderately alkaline.

Toto Series

The Toto series consists of very deep, very poorly drained soils on outwash plains, lake plains, and moraines. These soils formed in organic deposits over marl, coprogenous earth, and sand. Permeability is moderately rapid to moderately slow in the organic material, slow to moderate in the coprogenous earth, and rapid in the underlying sandy sediments. Slopes range from 0 to 2 percent.

Toto soils are similar to Adrian and Houghton soils and are adjacent to Martisco Variant soils on the landscape. Adrian soils formed in 16 to 50 inches of muck over sand. Houghton soils formed in more than 51 inches of muck. Martisco Variant soils formed in marl and coprogenous earth over sandy deposits. They are in the slightly higher areas.

Typical pedon of Toto muck, drained, in a cultivated field; 2,500 feet west and 2,120 feet south of the northeast corner of sec. 11, T. 29 N., R. 9 W.

Op—0 to 10 inches; sapric material, black (N 2/0) broken face and rubbed; about 48 percent fiber, 12 percent rubbed; weak medium granular structure; very friable; common medium and fine roots; primarily herbaceous fiber; medium acid; abrupt smooth boundary.

Oa1—10 to 16 inches; sapric material, very dark gray (N 3/0) broken face, dark brown (7.5YR 3/2) rubbed; about 60 percent fiber, 16 percent rubbed; moderate medium platy structure; friable; common medium and fine roots; primarily herbaceous fiber; neutral; clear wavy boundary.

Oa2—16 to 24 inches; sapric material, dark brown (7.5YR 3/2) broken face and rubbed; about 80 percent fiber, less than 5 percent rubbed; moderate thick platy structure; friable; common fine and very fine roots; sodium pyrophosphate extract is very pale brown (10YR 7/4); primarily herbaceous fiber; mildly alkaline; clear wavy boundary.

C—24 to 32 inches; pale brown (10YR 6/3) marl; common medium distinct gray (10YR 5/1) mottles; massive; friable; few very fine roots; yellowish red (5YR 5/6) iron stains around old root channels; dark brown (7.5YR 3/2) organic material lining old root channels; strong effervescence; moderately alkaline; clear wavy boundary.

Cg1—32 to 38 inches; dark gray (5Y 4/1) coprogenous earth; common medium distinct yellowish brown (10YR 5/6) mottles; massive; friable; sodium pyrophosphate extract is white (10YR 8/1); strong brown (7.5YR 4/6) iron stains around old root channels; strong effervescence; moderately alkaline; clear wavy boundary.

Cg2—38 to 60 inches; grayish brown (10YR 5/2) sand; common medium distinct brownish yellow (10YR 6/8) mottles; single grain; loose; slight effervescence; moderately alkaline.

The organic material is primarily herbaceous and ranges from 16 to 35 inches in thickness. Depth to the sandy material ranges from 30 to 46 inches. The combined thickness of the marl and coprogenous earth layers ranges from 12 to 30 inches. The Oa horizon has hue of 10YR or 7.5YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. In some pedons it has thin layers of hemic material. This horizon is medium acid to mildly alkaline. The C horizon has hue of 10YR, 2.5Y, or 5Y, value of 5 or 6, and chroma of 1 to 6. The Cg1 horizon has hue of 10YR, 2.5Y, or 5Y, value of 3 or 4, and chroma of 1 to 4. The Cg2 horizon has hue of 10YR, value of 4 to 6, and chroma of 1 to 6. The Cg horizon is neutral to moderately alkaline.

Wallkill Series

The Wallkill series consists of very deep, very poorly

drained soils on outwash plains and recessional moraines. These soils formed in sediments washed from adjacent slopes and deposited over organic deposits in potholes. Permeability is moderate in the mineral layers and moderately rapid or rapid in the organic layers. Slopes range from 0 to 2 percent.

Wallkill soils are similar to Peotone and Wallkill Variant soils and are adjacent to Octagon soils on the landscape. Peotone and Octagon soils are not underlain by organic deposits. Peotone soils contain more clay in the solum than the Wallkill soils. Wallkill Variant soils have more clay in the surface soil than the Wallkill soils. Octagon soils have a thinner dark surface soil than the Wallkill soils. They are in the higher positions on the landscape.

Typical pedon of Wallkill loam, pothole, in a cultivated field; 1,540 feet east and 1,200 feet north of the southwest corner of sec. 2, T. 28 N., R. 10 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; many very fine roots; slightly acid; abrupt smooth boundary.

A—9 to 31 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure; friable; few very fine roots; slightly acid; abrupt wavy boundary.

Oa1—31 to 36 inches; sapric material, black (N 2/0) broken face, very dark brown (10YR 2/2) rubbed; about 30 percent fiber, 5 percent rubbed; moderate medium platy structure; very friable; mostly herbaceous fiber; 2 percent mineral content; slightly acid; clear wavy boundary.

Oa2—36 to 60 inches; sapric material, dark brown (7.5YR 3/2) broken face, very dark grayish brown (10YR 3/2) rubbed; about 35 percent fiber, 5 percent rubbed; weak thick platy structure; very friable; mostly herbaceous fiber; 1 percent mineral content; neutral.

The thickness of the mineral soil over the organic material ranges from 16 to 40 inches. The A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2. It is silt loam or loam. It ranges from strongly acid to mildly alkaline. The Oa horizon has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. In some pedons it has thin layers of hemic material in the lower part. Fiber content is less than 10 percent when rubbed. Reaction ranges from medium acid to mildly alkaline in the Oa horizon.

Wallkill Variant

The Wallkill Variant consists of very deep, very poorly drained soils on outwash plains and recessional moraines. These soils formed in lacustrine sediments over organic deposits. Permeability is moderately slow in the mineral layers and moderately slow to moderately rapid in the organic layers. Slopes are 0 to 1 percent.

Wallkill Variant soils are similar to Peotone and Wallkill soils and are adjacent to Gilford and Oakville soils on the landscape. Gilford, Oakville, and Peotone soils are not underlain by organic deposits. Peotone soils have a thicker surface soil than the Wallkill Variant soils. Wallkill soils have less clay in the surface soil than the Wallkill Variant soils. Gilford soils have less clay in the solum than the Wallkill Variant soils. They are in the slightly higher areas. Oakville soils are browner in the subsoil than the Wallkill Variant soils and have less clay in the solum. They are in the more sloping areas.

Typical pedon of Wallkill Variant mucky silty clay, in a cultivated field; 200 feet west and 2,400 feet south of the northeast corner of sec. 19, T. 30 N., R. 8 W.

Ap—0 to 10 inches; black (N 2/0) mucky silty clay, very dark grayish brown (10YR 3/2) dry; moderate fine granular structure; friable; common fine roots; medium acid; abrupt smooth boundary.

A1—10 to 18 inches; black (5Y 2.5/1) silty clay, dark gray (10YR 4/1) dry; moderate fine subangular blocky structure; firm; few very fine roots; thin continuous black (N 2/0) organic coatings on faces of peds; slightly acid; clear wavy boundary.

A2—18 to 24 inches; black (5Y 2.5/1) silty clay, very dark gray (10YR 3/1) dry; moderate medium subangular blocky structure; firm; thin continuous black (N 2/0) organic coatings on faces of peds; few fine dark brown (7.5YR 4/4) iron and manganese stains; slightly acid; gradual wavy boundary.

Bg1—24 to 30 inches; gray (5Y 5/1) silty clay; common fine distinct olive (5Y 5/4) mottles; moderate medium subangular blocky structure; firm; thin discontinuous very dark gray (5Y 3/1) organic coatings on faces of peds; few fine dark brown (7.5YR 4/4) iron and manganese stains; medium acid; gradual wavy boundary.

Bg2—30 to 38 inches; olive gray (5Y 4/2) mucky silty clay; weak coarse subangular blocky structure; firm; medium continuous very dark gray (5Y 3/1) organic coatings on faces of peds; medium acid; clear wavy boundary.

Oa—38 to 60 inches; sapric material, black (5YR 2.5/1) broken face, dark reddish brown (5YR 3/2) rubbed; about 42 percent fiber, 4 percent rubbed; weak medium platy structure; friable; mostly herbaceous fiber; 5 percent mineral content; strongly acid.

The thickness of the mineral soil over the organic material ranges from 16 to 40 inches. The A horizon

has hue of 10YR, 2.5Y, or 5Y or is neutral in hue. It has value of 2 to 3 and chroma of 0 to 2. It is silty clay loam, mucky silty clay loam, silty clay, or mucky silty clay. It is strongly acid to neutral. The Bg horizon has hue of 2.5Y or 5Y, value of 4 or 5, and chroma of 1 or 2. It is silty clay loam, silty clay, or mucky silty clay. It is strongly acid to neutral. The Oa horizon has hue of 5YR, 7.5YR, or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. In some pedons it has thin layers of hemic material. Fiber content is less than 10 percent when rubbed. Reaction in the Oa horizon ranges from strongly acid to neutral.

Watseka Series

The Watseka series consists of very deep, somewhat poorly drained, rapidly permeable soils on outwash plains and recessional moraines. These soils formed in sandy sediments. Slopes are 0 to 1 percent.

Watseka soils are similar to Algansee, Morocco, Tedrow, and Zaborosky soils and are adjacent to Maumee, Nesius, and Sparta soils on the landscape. Algansee soils have an irregular decrease in organic matter with increasing depth. Morocco, Tedrow, and Zaborosky soils do not have a thick, dark surface soil. Maumee soils are grayer in the upper part of the subsoil than the Watseka soils. Also, they are in lower positions on the landscape. Nesius and Sparta soils are browner in the subsoil than the Watseka soils. They are in the higher areas.

Typical pedon of Watseka loamy sand, 0 to 1 percent slopes, in a cultivated field; 2,800 feet east and 650 feet north of the southwest corner of sec. 12, T. 31 N., R. 10 W.

Ap—0 to 10 inches; black (10YR 2/1) loamy sand, dark grayish brown (10YR 4/2) dry; weak fine granular structure; very friable; many medium and fine roots; neutral; abrupt smooth boundary.

Bw1—10 to 13 inches; brown (10YR 5/3) loamy sand; weak medium granular structure; very friable; few fine and very fine roots; neutral; gradual wavy boundary.

Bw2—13 to 23 inches; brown (10YR 5/3) sand; common medium distinct gray (10YR 5/1) mottles; weak fine granular structure; very friable; neutral; clear wavy boundary.

Bg—23 to 33 inches; grayish brown (10YR 5/2) sand; few medium distinct yellowish brown (10YR 5/4) mottles; weak fine granular structure; very friable; neutral; clear wavy boundary.

Cg1—33 to 39 inches; dark gray (10YR 4/1) sand; single grain; loose; neutral; clear wavy boundary.

Cg2—39 to 60 inches; gray (10YR 5/1) sand; single grain; loose; neutral.

The thickness of the solum ranges from 24 to 40 inches. The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. It is loamy fine sand, loamy sand, fine sand, or sand. The B horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is loamy sand, loamy fine sand, fine sand, or sand. It is strongly acid to neutral. The C horizon has hue of 10YR, value of 4 to 6, and chroma of 1 to 4. It is loamy fine sand, fine sand, or sand. It is medium acid to neutral.

Wesley Series

The Wesley series consists of very deep, somewhat poorly drained soils on lake plains. These soils formed in loamy and sandy outwash and in the underlying lacustrine sediments. Permeability is moderately rapid or rapid in the upper part of the solum and moderately slow in the lower part of the solum and in the substratum. Slopes are 0 to 1 percent.

Wesley soils are similar to Papineau, Strole, and Swygert soils and are adjacent to Iroquois and Simonin soils on the landscape. Papineau, Strole, and Swygert soils contain less sand in the upper part of the solum than the Wesley soils. Iroquois soils are grayer in the upper part of the subsoil than the Wesley soils. Also, they are lower on the landscape. Simonin soils are browner in the subsoil than the Wesley soils and contain more sand in the upper part of the solum. They are in the slightly higher positions on the landscape.

Typical pedon of Wesley fine sandy loam, 0 to 1 percent slopes, in a cultivated field; 2,100 feet east and 150 feet north of the southwest corner of sec. 1, T. 28 N., R. 8 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) fine sandy loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; many fine and very fine roots; neutral; abrupt smooth boundary.

A—9 to 14 inches; very dark grayish brown (10YR 3/2) fine sandy loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; friable; common very fine roots; slightly acid; clear wavy boundary.

Bw1—14 to 26 inches; dark yellowish brown (10YR 4/4) fine sandy loam; common medium distinct grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; friable; common very fine roots; slightly acid; clear wavy boundary.

Bw2—26 to 34 inches; brown (10YR 5/3) fine sandy loam; common medium distinct light gray (10YR 6/1) mottles; weak medium subangular blocky structure; friable; few very fine roots; thin strata of brown (10YR 5/3) loamy fine sand totaling 2 inches; neutral; abrupt wavy boundary.

2Bg—34 to 48 inches; olive gray (5Y 5/2) silty clay loam; common medium prominent brownish yellow (10YR 6/8) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few light gray (10YR 7/1) calcium carbonate coatings on faces of prisms and peds; slight effervescence; mildly alkaline; clear wavy boundary.

2Cg—48 to 60 inches; gray (N 5/0) silty clay loam; few medium prominent brownish yellow (10YR 6/8) mottles; massive; firm; few white (10YR 8/1) calcium carbonate coatings on internal planes; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 30 to 50 inches. Depth to the underlying fine textured material ranges from 18 to 40 inches. The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is sandy loam or fine sandy loam. The Bw horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is sandy loam or fine sandy loam. It is medium acid to neutral. The 2B horizon has hue of 5Y or 2.5Y, value of 4 or 5, and chroma of 2 to 4, or it is neutral in hue and has value of 4 or 5. It is silty clay loam or clay loam. It is neutral or mildly alkaline. The 2C horizon has hue of 5Y or 2.5Y, value of 4 to 6, and chroma of 1 to 3, or it is neutral in hue and has value of 4 or 5. It is silty clay loam or clay loam. It is mildly alkaline or moderately alkaline.

Whitaker Series

The Whitaker series consists of very deep, somewhat poorly drained soils on ground moraines. These soils formed in glaciofluvial material. Permeability is moderate in the upper part and moderate or moderately rapid in the substratum. Slopes range from 0 to 2 percent.

Whitaker soils are similar to Seafield soils and are adjacent to Aubbeenaubbee and Martinsville soils on the landscape. Seafield soils have less clay in the subsoil than the Whitaker soils. Aubbeenaubbee soils have more sand in the upper part of the subsoil than the Whitaker soils. Also, they are higher on the landscape. Martinsville soils are browner throughout than the Whitaker soils. They are in the more sloping areas.

Typical pedon of Whitaker fine sandy loam, in an area of Aubbeenaubbee-Whitaker complex, 0 to 2 percent slopes, in a cultivated field; 800 feet east and 290 feet south of the northwest corner of sec. 5, T. 27 N., R. 9 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) fine sandy loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; very friable; few medium and fine roots; slightly acid; abrupt smooth boundary.

E—9 to 16 inches; brown (10YR 5/3) fine sandy loam; common medium distinct gray (10YR 6/1) mottles; weak coarse subangular blocky structure; very friable; few medium and fine roots; medium acid; clear wavy boundary.

Btg1—16 to 24 inches; grayish brown (10YR 5/2) clay loam; common medium distinct brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure; friable; thin discontinuous dark gray (10YR 4/1) clay films on faces of peds; medium acid; gradual wavy boundary.

Btg2—24 to 38 inches; light brownish gray (10YR 6/2) clay loam; common medium distinct brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure; friable; thin discontinuous gray (10YR 5/1) clay films on faces of peds; slightly acid; clear wavy boundary.

Btg3—38 to 49 inches; light brownish gray (2.5Y 6/2) sandy clay loam; many coarse distinct yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; friable; thin discontinuous gray (10YR 5/1) clay films on faces of peds; neutral; clear wavy boundary.

C—49 to 60 inches; light olive brown (2.5Y 5/4) very fine sandy loam; common medium distinct yellowish brown (10YR 5/8) mottles; massive; friable; thin lenses of light olive brown (2.5Y 5/4) loamy sand and silt loam totaling 4 inches; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches. The Ap horizon has hue of 10YR, value of 4 to 6, and chroma of 2 or 3. The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 6. It is clay loam, sandy clay loam, or loam. The Bt horizon is strongly acid or medium acid in the upper part and medium acid to neutral in the lower part. The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 6. It is sandy loam, fine sandy loam, very fine sandy loam, loam, or silt loam and has thin strata of sand, loamy sand, or coarse sand. It is slightly acid to moderately alkaline.

Williamstown Series

The Williamstown series consists of very deep, moderately well drained soils on terraces and ground moraines. These soils formed in glacial till. Permeability is moderate in the solum and slow or very slow in the substratum. Slopes range from 0 to 6 percent.

Williamstown soils are adjacent to Aubbeenaubbee, Martinsville, and Miami soils on the landscape.

Aubbeenaubbee soils are grayer in the upper part of the solum than the Williamstown soils. They are in the less sloping areas. Martinsville and Miami soils are browner in the subsoil than the Williamstown soils. They are in the more sloping areas.

Typical pedon of Williamstown loam, in an area of Martinsville-Williamstown complex, 2 to 6 percent slopes, eroded, in a cultivated field; 1,200 feet west and 500 feet north of the southeast corner of sec. 30, T. 28 N., R. 8 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) loam, light brownish gray (10YR 6/2) dry; mixed with brown (10YR 4/3) clay loam from the subsoil; weak medium granular structure; friable; common very fine roots; slightly acid; abrupt smooth boundary.

Bt1—8 to 18 inches; brown (10YR 4/3) clay loam; few fine distinct grayish brown (10YR 5/2) mottles; moderate fine subangular blocky structure; friable; common very fine roots; thin continuous dark brown (10YR 4/3) clay films on faces of peds; slightly acid; clear wavy boundary.

Bt2—18 to 30 inches; yellowish brown (10YR 5/4) clay loam; common fine distinct grayish brown (10YR 5/2) and few medium distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; slightly acid; clear wavy boundary.

Bt3—30 to 35 inches; yellowish brown (10YR 5/6) loam; common fine distinct gray (10YR 5/1) and common medium faint yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; firm; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; neutral; clear wavy boundary.

Cd—35 to 60 inches; yellowish brown (10YR 5/4) loam; few fine distinct gray (10YR 6/1) and yellowish brown (10YR 5/8) mottles; massive; very firm; slight effervescence; mildly alkaline.

The thickness of the solum ranges from 30 to 40 inches. The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. It mainly ranges from medium acid to neutral, but the range includes mildly alkaline in the lower part. The Cd horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. It is mildly alkaline or moderately alkaline.

Zaborosky Series

The Zaborosky series consists of very deep, somewhat poorly drained, rapidly permeable soils on lake plains. These soils formed in water- and wind-reworked sandy deposits over sandy lake-bed sediments. Slopes range from 0 to 4 percent.

Zaborosky soils are similar to Algansee, Morocco, Tedrow, and Watseka soils and are adjacent to Conrad, Kentland, and Oakville soils on the landscape. Algansee soils have an irregular decrease in organic matter content. Tedrow, Morocco, and Watseka soils do not have buried horizons. Conrad and Kentland soils are grayer in the upper part of the subsoil than the Zaborosky soils. Also, they are in lower positions on the landscape. Oakville soils do not have gray mottles in the subsoil. They are in the higher positions.

Typical pedon of Zaborosky fine sand, 0 to 2 percent slopes, in a cultivated field; 2,300 feet south and 1,500 feet west of the northeast corner of sec. 33, T. 31 N., R. 9 W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) fine sand, gray (10YR 5/1) dry; single grain; loose; common fine roots; slightly acid; abrupt smooth boundary.

C—8 to 23 inches; pale brown (10YR 6/3) fine sand; common medium distinct dark grayish brown (10YR 4/2) and dark yellowish brown (10YR 4/6) mottles; single grain; loose; common fine and very fine roots; few streaks of light gray (10YR 7/1) sand grains; very strongly acid; clear wavy boundary.

Ab—23 to 32 inches; black (10YR 2/1) loamy sand, dark gray (10YR 4/1) dry; weak coarse subangular blocky structure; very friable; few streaks of light brownish gray (10YR 6/2) sand grains; few thin strata of black (N 2/0) sapric material; extremely acid; clear wavy boundary.

Bwb—32 to 49 inches; brown (10YR 5/3) fine sand; few fine distinct light gray (10YR 7/2) and yellowish brown (10YR 5/6) mottles; single grain; loose; very strongly acid; gradual wavy boundary.

Cb1—49 to 54 inches; yellowish brown (10YR 5/4) sand; many coarse distinct strong brown (7.5YR 5/8) mottles; single grain; loose; neutral; gradual wavy boundary.

Cb2—54 to 60 inches; yellowish brown (10YR 5/6) sand; single grain; loose; slight effervescence; mildly alkaline.

Depth to the buried A horizon ranges from 20 to 40 inches. The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 1 to 3. It is medium acid to neutral. The C horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. The upper part dominantly has chroma of 3 or more and has some mottles with chroma of 2 or less. The C horizon is very strongly acid to slightly acid. The Ab horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is loamy sand or loamy fine sand. It is extremely acid to slightly acid. The Bwb horizon has hue of 10YR, value of 4 to 6, and chroma

of 3 to 6. It is very strongly acid to medium acid. The Cb horizon has hue of 10YR, value of 5 to 7, and chroma of 3 to 8. It is neutral or mildly alkaline.

Zadog Series

The Zadog series consists of very deep, very poorly drained soils on outwash plains. These soils formed in sandy sediments. Permeability is moderate in the solum and rapid in the substratum. Slopes range from 0 to 2 percent.

Zadog soils are similar to Barry, Gilford, Granby, and Maumee soils and are adjacent to Morocco soils on the landscape. Barry soils have more clay in the solum than the Zadog soils. Barry, Gilford, Granby, Maumee, and Morocco soils do not have iron nodules in the solum. Granby and Maumee soils have less clay in the solum than the Zadog soils. They are in the higher positions on the landscape. Morocco soils are browner in the solum than the Zadog soils. They are in the slightly higher positions.

Typical pedon of Zadog loamy sand, in an area of Zadog-Granby complex, in a cultivated field; 980 feet north and 1,000 feet east of the southwest corner of sec. 2, T. 31 N., R. 8 W.

Ap—0 to 10 inches; black (10YR 2/1) loamy sand, very dark grayish brown (10YR 3/2) dry; moderate fine granular structure; very friable; common fine roots; 1 percent brown (7.5YR 4/4) iron accumulations; slightly acid; abrupt smooth boundary.

A—10 to 15 inches; black (N 2/0) fine sandy loam, dark brown (7.5YR 3/2) dry; common medium faint dark brown (7.5YR 3/4) mottles; moderate fine subangular blocky structure; very friable; common very fine roots; 3 percent brown (7.5YR 4/4) iron accumulations and nodules; slightly acid; clear wavy boundary.

Bs1—15 to 21 inches; brown (7.5YR 4/4) fine sandy loam; many medium distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; few fine roots; 10 percent dark brown (7.5YR 4/4) iron accumulations and nodules; slightly acid; clear wavy boundary.

Bs2—21 to 26 inches; reddish brown (5YR 5/4) sandy clay loam; many medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; 10 percent strong brown (7.5YR 4/6) iron accumulations and nodules; common medium dark brown (7.5YR 3/2) organic lenses and streaks; neutral; abrupt wavy boundary.

Bg—26 to 30 inches; grayish brown (10YR 5/2) fine sandy loam; many medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; 5 percent strong brown (7.5YR 5/6) iron accumulations and nodules; few medium dark brown (7.5YR 3/2) organic lenses and streaks; neutral; clear wavy boundary.

C1—30 to 41 inches; yellowish brown (10YR 5/4) fine sand; many medium distinct reddish yellow (7.5YR 6/8) mottles; single grain; loose; 5 percent strong brown (7.5YR 5/6) iron accumulations and nodules; slight effervescence; mildly alkaline; gradual wavy boundary.

C2—41 to 60 inches; strong brown (7.5YR 5/6) fine sand; common medium distinct yellowish brown (10YR 5/8) mottles; single grain; loose; 5 percent strong brown (7.5YR 5/6) iron accumulations and nodules; slight effervescence; moderately alkaline.

The thickness of the solum ranges from 20 to 40 inches. The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2. It contains few or common iron accumulations and nodules that have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8. The Bs horizon has hue of 10YR, 7.5YR, or 5YR, value of 4 or 5, and chroma of 4 to 8. It contains up to 10 percent iron accumulations and nodules that have colors similar to those in the A horizon. The Bg horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. It contains up to 10 percent iron accumulations and nodules that have colors similar to those in the A horizon. The C horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 1 to 6. It is fine sand or sand.

Formation of the Soils

This section describes the major factors of soil formation and their importance in the formation of the soils in Newton County. It also describes the processes of soil formation that have affected the soils in the county.

Factors of Soil Formation

Soil is produced by soil-forming processes acting on material deposited or accumulated by geologic agents. The characteristics of the soil at any given point are determined by the physical and mineralogical composition of the parent material; the climate under which the soil has formed; the plant and animal life on and in the soil; the relief, or lay of the land; and the length of time the forces of soil formation have acted on the soil material.

Climate and plant and animal life, chiefly plants, are active factors of soil formation. They act on the parent material that has accumulated through the weathering of rock and slowly change it into a natural body that has genetically related horizons. The effects of climate and plant and animal life are conditioned by relief. The parent material also affects the kind of soil profile that is formed and, in extreme cases, determines it almost entirely. Finally, time is needed for the development of a soil profile. Some time is always required for the differentiation of soil horizons. Usually, a long time is needed for the development of distinct horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effects of any one factor unless conditions are specified for the other four. Many of the processes of soil formation are unknown.

Parent Material

The parent materials in Newton County are unconsolidated glacial deposits left some 12,000 to 15,000 years ago by glaciers as they receded from the area. The kinds of parent material include glacial till, outwash deposits, lacustrine sediments, organic material, and alluvium.

Most of the parent materials were deposited by glaciers or by meltwater from the glaciers. Some of these materials were reworked and redeposited by subsequent actions of water and wind. Parent materials reflect the chemical and mineralogical composition of the materials over which the glaciers passed. Although the various parent materials of the soils in Newton County are of common glacial origin, their properties extend over a wide range, sometimes within small areas, depending on how the materials were deposited.

Glacial till is material laid down directly by glaciers with a minimum of water action. It consists of particles of different sizes that are mixed together. Soils that formed in till contain all sizes of sand separates plus other rock fragments. Many of the small pebbles in glacial till have sharp corners, indicating that they have not been worn by water action. The glacial till in Newton County is calcareous. It is friable, firm, or very firm and has textures of loam, silt loam, silty clay loam, silty clay, or clay. It is typically light olive brown, yellowish brown, brown, or light yellowish brown. Montmorenci soils formed in glacial till. These soils typically are loamy and have well developed structure.

Outwash deposits are materials deposited by running water from melting glaciers. The size of the particles that make up outwash material varies, depending on the speed of the stream that carried them. When the water velocity slowed down, the coarser particles were deposited. Outwash material typically contains more than 25 percent coarse sand and very coarse sand, and in many cases these textures make up as much as 40 percent. Finer particles, such as very fine sand, silt, and clay, can be carried by water that is moving relatively slowly. Outwash deposits generally consist of layers of particles of similar size. Martinsville soils formed in outwash material.

Lacustrine sediments were deposited in still, or ponded, glacial meltwater. Because the coarser fragments dropped out of moving water as outwash, only the finer particles, such as very fine sand, silt, and

clay, remained to settle out in still water. Lacustrine material contains more than 75 percent particles finer than fine sand. Strole soils formed in lacustrine materials.

Organic material consists of plant remains. After the glacier retreated, water was left ponded in depressions, primarily on recessional moraines and on outwash plains. Grasses and sedges growing on the perimeter of these bodies of water died back and accumulated in the water. Because of wetness and cool temperatures, the plant remains decomposed slowly. Later, herbaceous plants and other water-tolerant species grew in these areas, and their residues also accumulated. Eventually, the lakes filled with organic residues, which developed slowly into peat. In some areas the decomposition of plant remains formed deposits of muck. In other areas, plant materials have not been altered significantly since they were deposited. Houghton and Toto soils formed in organic parent material.

Alluvial material was deposited by floodwaters of present streams in comparatively recent times. The texture of this material depends on the energy level of the water from which it was deposited. The alluvium deposited along the Iroquois River is primarily silty and loamy because the water was rather sluggish. Soils along the Kankakee River formed in a coarser textured material, indicating a higher energy level of the water in that river. Sawabash and Prochaska soils formed in alluvium.

Some soils formed in a combination of different kinds of deposits. Barce and Sumava soils, for example, formed in outwash material and glacial till.

Climate

Climate helps to determine the kind of plant and animal life on and in the soil, the amount of water available for the weathering of minerals and the transporting of weathered products, and the rate of chemical reactions in the soil. Rainfall and temperature are the two main climatic factors that influence soil formation. Newton County has a humid, temperate climate. The climate of the survey area is affected by three primary air masses. These are a warm, humid effect from the Gulf of Mexico, a dry seasonal effect from the Plains, and a cold effect from the Arctic. There is also a minor local influence because of the proximity of Lake Michigan.

Water is necessary for soil formation. It is required by plants and animals. Water transports materials over the surface of the land and within the soil profile. As water freezes, it influences the development of soil structure.

Water moves into a soil or becomes surface water runoff. Losses within the soil occur mainly from evaporation, transpiration, and gravity (leaching).

Weather events can alter soils significantly in a short time. For example, the movement of soil during an intense rainstorm can result in severe erosion or in the formation of gullies. A droughty, very hot summer, however, can greatly reduce vegetative growth and ultimately the amount of organic matter added to the soil.

Plant and Animal Life

Macroscopic and microscopic organisms have played a vital role in the formation of the soils in Newton County, and they are still playing an important role. The kind of material on and in the soil depends on the kinds of plants and animals that are in the soil. For example, soils that formed under dominantly forest vegetation generally have less total accumulated organic matter than soils that formed under dominantly grasses, such as Corwin soils. The major contributions of plants and animals are the addition of organic matter, the transformation of litter into humus, and mixing of the soil. The remains of plants and animals accumulate in the soil, decay, and eventually become incorporated into the soil as organic matter. Bacteria and other micro-organisms help to break down the organic matter so that it can be utilized by growing plants. Decayed plant roots and earthworms provide channels for air and water exchanges, which facilitate soil formation. Human activities also influence the formation of soils by altering many aspects of the biotic community. There is a very delicate balance between plants and animals and their effects on soil formation.

Relief

Relief refers to the relative differences in elevation of the land surface. When the glaciers receded from the area, they left behind many distinctive landforms, such as eskers, organic basins, moraines, outwash plains, and lake plains. Soil properties that are related to relief include the thickness of the solum, the thickness and organic matter content of the surface soil, the relative wetness of the profile, and soil reaction, soil temperature, and soil color.

In Newton County, soils in nearly level areas, such as Selma soils, tend to have a thicker solum than the soils on slopes. Soils on slopes, such as Octagon soils, have a thinner solum because of erosion, a lack of percolating water because of the runoff rate, or both.

Soils in depressions, such as Wallkill soils, tend to have an accumulation of organic matter in the surface soil. Depressions act as settling basins. They accumulate mineral materials washed in from the higher surrounding areas. They also tend to accumulate

organic residue because they are slightly wetter and cooler than the surrounding soils.

In Peotone soils, which are in depressions, the water table is generally closer to the surface than in sloping or convex soils, such as Miami soils. A saturated soil condition alters physical and chemical reactions. Root growth may be retarded in saturated soils because of a lack of oxygen. Saturated soils also warm up more slowly in spring than the surrounding nonsaturated soils.

The depth to the water table in somewhat poorly drained soils, such as Darroch soils, is typically subject to seasonal fluctuations. In at least part of the year, these soils may not be saturated and air moves into the profile. Oxidation takes place and normally results in mottled colors in the soil. In general, soils in a drainage sequence (for example, a sequence of well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained soils) have properties that relate to their position on the landscape.

Time

Time determines the degree of profile development in a soil. The influence of time may be altered by landscape characteristics. For example, erosion or deposition can significantly reduce the impact of time on soil formation.

The length of time that soil-forming factors and processes have affected the soil material are reflected in the relative stage of the soil's development. Such terms as young, mature, and old are applied to the stages of development of a soil. In Newton County, Foresman and Swygert soils are examples of mature soils because they show advanced development. Newton County has few soils that can be considered old because relatively stable conditions have prevailed for only about 12,000 to 15,000 years.

Factors affecting the rates of soil formation include the intensity of weathering, physical and chemical rearrangements of soil materials within the soil body, and relative changes in conditions. Landforms are constantly changing as surfaces are truncated or buried. In each case, the land surface is modified and thus affects the age of the soil.

Peotone soils are examples of young soils. They formed in colluvium in potholes on ground moraines and recessional moraines. Corwin soils show the effects of time on the leaching of calcium carbonates from the soil. These soils formed in calcareous parent material, but the profile is now leached to a depth of 24 to 40 inches.

Processes of Soil Formation

Several processes have been involved in the formation of the soils in Newton County. These include the accumulation of organic matter; the transfer and removal of calcium carbonates and bases; and the translocation of silicate clay minerals. In most soils, more than one of these processes have been active in the differentiation of horizons within the profile. Leaching of bases and translocation of silicate clays are the most important processes affecting the differentiation of horizons in the soils in Newton County. Leaching is generally believed to precede the translocation of clay minerals.

Some organic matter accumulated in the surface layer of all of the soils in the county. The content of organic matter is low in some soils and high in others. Generally, the soils that contain the most organic matter, such as Gilford and Selma soils, have a thick, dark surface layer.

Carbonates and bases have been leached from the upper part of nearly all of the soils in the county. Most of the carbonates and some of the bases have been leached from the A and B horizons of well drained soils. Even the wettest soils have been somewhat leached, as indicated by the absence of carbonates and by acid reaction. Leaching is slow in wet soils because of the high water table or because water moves slowly through the soils.

Clay accumulates in pores and other voids and forms a film on the surface. Water moves along this film. Corwin and Papineau soils are examples of soils in which translocated silicate clays have accumulated as clay films in the Bt horizon.

The reduction and transfer of iron has occurred in all of the very poorly drained, poorly drained, and somewhat poorly drained soils in Newton County. This process, called gleying, has been significant in the differentiation of horizons in naturally wet soils. The gray color of the subsoil indicates the reduction and removal of iron oxides. Reduction is commonly accompanied by some downward transfer of the iron, either to a lower horizon or completely out of the profile. Mottles indicate segregation of iron.

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Glossary

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles 2 millimeters to 38 centimeters (15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons.

Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

End moraine. See Terminal moraine.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, for example, fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Esker (geology). A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Forb. Any herbaceous plant not a grass or a sedge.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material

deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is

assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by the wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage.

Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saltation. The rapid movement by the wind of soil particles, which impact and dislodge other soil particles and move them a short series of skips and bounces along the surface of the ground.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the substratum. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters

in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0 5
Medium sand	0.5 to 0 25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the substratum. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). A layer of otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Varve. A sedimentary layer of a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited,

usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1961-90 at Kentland, Indiana)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	31.3	14.7	23.0	57	-17	9	1.54	0.50	2.38	3	6.8
February----	36.0	18.6	27.3	62	-13	19	1.55	.51	2.41	3	7.6
March--------	48.9	30.3	39.6	78	3	127	2.91	1.59	4.07	6	3.7
April--------	62.6	39.9	51.2	86	19	353	3.55	2.24	4.74	8	1.0
May----------	74.2	50.2	62.2	92	30	688	3.90	2.12	5.47	7	.0
June---------	83.6	59.7	71.7	97	41	950	4.17	2.32	5.80	6	.0
July---------	85.9	63.4	74.7	98	47	1,063	4.24	1.97	6.19	6	.0
August-------	83.8	60.8	72.3	95	44	1,001	3.71	1.91	5.29	6	.0
September---	78.3	54.1	66.2	93	34	786	3.39	1.50	5.23	5	.0
October-----	66.2	42.9	54.5	87	22	456	2.66	1.31	3.82	5	.1
November----	50.6	33.2	41.9	75	11	149	2.99	1.65	4.17	6	2.0
December----	36.2	20.9	28.5	63	-10	25	2.71	1.14	4.04	5	6.2
Yearly:											
Average---	61.5	40.7	51.1	---	---	---	---	---	---	---	---
Extreme---	104	-25	---	99	-18	---	---	---	---	---	---
Total-----	---	---	---	---	---	5,626	37.32	31.85	41.99	66	27.4

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1961-90 at Kentland, Indiana)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 14	Apr. 28	May 14
2 years in 10 later than--	Apr. 9	Apr. 23	May 9
5 years in 10 later than--	Mar. 30	Apr. 14	Apr. 28
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 19	Oct. 8	Sept. 26
2 years in 10 earlier than--	Oct. 24	Oct. 13	Sept. 30
5 years in 10 earlier than--	Nov. 5	Oct. 24	Oct. 10

TABLE 3.--GROWING SEASON

(Recorded in the period 1961-90 at Kentland, Indiana)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	194	170	144
8 years in 10	203	178	150
5 years in 10	218	191	163
2 years in 10	234	205	176
1 year in 10	243	212	182

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
Ac	Ackerman-Martisco Variant complex, drained	2,185	0.8
Ad	Adrian muck, drained	722	0.3
Af	Adrian Variant muck, drained	354	0.1
Ap	Algansee loamy sand, frequently flooded, undrained	487	0.2
Ar	Aquolls, ponded	538	0.2
AuA	Aubbeenaubbee-Whitaker complex, 0 to 2 percent slopes	1,626	0.6
AyB	Ayr loamy fine sand, 1 to 4 percent slopes	1,295	0.5
AzA	Ayrmount loamy fine sand, 0 to 2 percent slopes	1,861	0.7
BbA	Barce-Corwin complex, 0 to 2 percent slopes	2,914	1.1
BfB2	Barce-Montmorenci complex, 1 to 4 percent slopes, eroded	3,409	1.3
Bh	Barry-Gilford complex	7,752	3.0
BmB	Brems loamy sand, 1 to 3 percent slopes	9,460	3.7
By	Bryce silty clay loam	1,171	0.5
Co	Comfrey loam, frequently flooded, undrained	1,197	0.5
Cr	Conrad loamy fine sand	4,470	1.7
CtA	Corwin fine sandy loam, 0 to 2 percent slopes	1,408	0.5
CtB2	Corwin fine sandy loam, 2 to 6 percent slopes, eroded	844	0.3
Cv	Craigmile sandy loam, frequently flooded	1,964	0.8
Cz	Craigmile mucky silt loam, frequently flooded, undrained	1,921	0.7
DaA	Darroch fine sandy loam, 0 to 2 percent slopes	759	0.3
DcA	Darroch silt loam, 0 to 2 percent slopes	8,023	3.1
DdA	Darroch fine sandy loam, sandy substratum, 0 to 2 percent slopes	1,002	0.4
DgA	Darroch loam, till substratum, 0 to 2 percent slopes	10,911	4.2
EsB	Elston Variant fine sandy loam, 1 to 3 percent slopes	547	0.2
FeA	Foresman fine sandy loam, 0 to 2 percent slopes	262	0.1
FoA	Foresman silt loam, 0 to 2 percent slopes	2,035	0.8
FoB2	Foresman silt loam, 2 to 6 percent slopes, eroded	464	0.2
FrA	Foresman fine sandy loam, till substratum, 0 to 2 percent slopes	1,039	0.4
FrB2	Foresman fine sandy loam, till substratum, 2 to 6 percent slopes, eroded	1,551	0.6
FtA	Foresman silt loam, till substratum, 0 to 2 percent slopes	3,867	1.5
FtB2	Foresman silt loam, till substratum, 2 to 6 percent slopes, eroded	1,443	0.6
FwA	Foresman silt loam, moderately fine substratum, 0 to 2 percent slopes	724	0.3
GbA	Gilboa-Odell complex, 0 to 2 percent slopes	5,266	2.0
Gf	Gilford fine sandy loam	1,906	0.7
GhB	Glenhall loam, 1 to 4 percent slopes	570	0.2
Gn	Granby mucky loamy fine sand	1,083	0.4
Gt	Granby loamy fine sand	32,757	12.7
Ho	Houghton muck, drained	397	0.2
Ir	Iroquois fine sandy loam	2,026	0.8
Ke	Kentland mucky fine sand	1,815	0.7
MeA	Martinsville-Williamstown complex, 0 to 2 percent slopes	287	0.1
MeB2	Martinsville-Williamstown complex, 2 to 6 percent slopes, eroded	567	0.2
Mh	Maumee loamy fine sand	924	0.4
Mk	Maumee mucky loamy fine sand	955	0.4
MnC2	Miami loam, 6 to 12 percent slopes, eroded	227	0.1
MnE	Miami loam, 15 to 25 percent slopes	359	0.1
Mp	Montgomery silty clay loam	3,273	1.3
MrB2	Montmorenci fine sandy loam, 2 to 6 percent slopes, eroded	978	0.4
MuA	Morocco loamy sand	11,540	4.5
NsA	Nesius loamy fine sand, 0 to 1 percent slopes	442	0.2
NsB	Nesius loamy fine sand, 1 to 4 percent slopes	1,804	0.7
Nw	Newton loamy fine sand, undrained	1,420	0.6
OaB	Oakville fine sand, 2 to 6 percent slopes	8,660	3.4
OaC	Oakville fine sand, 6 to 15 percent slopes	5,331	2.1
ObB	Oakville fine sand, moderately wet, 1 to 3 percent slopes	3,144	1.2
OcC2	Octagon loam, 6 to 12 percent slopes, eroded	518	0.2
OkB2	Octagon-Ayr complex, 2 to 6 percent slopes, eroded	4,454	1.7
OnA	Onarga fine sandy loam, moderately wet, 0 to 2 percent slopes	997	0.4
OnB2	Onarga fine sandy loam, moderately wet, 2 to 6 percent slopes, eroded	1,086	0.4
OpB2	Onarga fine sandy loam, till substratum, 2 to 6 percent slopes, eroded	562	0.2
OrB	Ormas loamy sand, sandy substratum, 1 to 4 percent slopes	278	0.1
PaA	Papineau fine sandy loam, 0 to 1 percent slopes	2,372	0.9

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
PaB	Papineau fine sandy loam, 1 to 3 percent slopes	298	0.1
Pp	Peotone silty clay loam, pothole	876	0.3
Pt	Pits, quarry	70	*
Pu	Prochaska loamy sand, rarely flooded	532	0.2
Px	Prochaska loamy sand, frequently flooded	455	0.2
Py	Prochaska loamy sand, frequently flooded, undrained	284	0.1
RtA	Ridgeville fine sandy loam, 0 to 2 percent slopes	1,598	0.6
RuA	Ridgeville fine sandy loam, till substratum, 0 to 2 percent slopes	453	0.2
Rv	Ross silt loam, frequently flooded	205	0.1
Sd	Sawabash silty clay loam, frequently flooded, undrained	1,267	0.5
SeA	Seafield fine sandy loam, 0 to 2 percent slopes	434	0.2
Sf	Selma fine sandy loam	970	0.4
Sg	Selma silt loam	10,325	4.0
Sh	Selma loam, sandy substratum	1,106	0.4
Sk	Selma silty clay loam, till substratum	19,986	7.7
SmB	Simonin loamy sand, 1 to 3 percent slopes	1,850	0.7
SrB	Sparta loamy fine sand, 1 to 4 percent slopes	325	0.1
SwA	Strole silty clay loam, 0 to 1 percent slopes	2,041	0.8
SxA	Sumava-Ridgeville-Odell complex, 0 to 2 percent slopes	8,144	3.2
SyA	Swygert silt loam, 0 to 2 percent slopes	1,293	0.5
SzB2	Swygert Variant-Simonin complex, 2 to 6 percent slopes, eroded	775	0.3
SzC2	Swygert Variant-Simonin complex, 6 to 15 percent slopes, eroded	200	0.1
TaA	Tedrow loamy fine sand, 0 to 2 percent slopes	2,246	0.9
To	Toto muck, drained	1,424	0.6
Ud	Udorthents, loamy	83	*
Wa	Wallkill loam, pothole	362	0.1
Wc	Wallkill Varient mucky silty clay	637	0.2
WeA	Watseka loamy sand, 0 to 1 percent slopes	2,855	1.1
WkA	Wesley fine sandy loam, 0 to 1 percent slopes	307	0.1
ZaA	Zaborosky fine sand, 0 to 2 percent slopes	1,551	0.6
ZbB	Zaborosky-Oakville, moderately wet, complex, 2 to 9 percent slopes, undulating	664	0.3
Zg	Zadog-Granby complex	19,017	7.4
	Water areas less than 40 acres in size	780	0.3
	Water areas more than 40 acres in size	464	0.2
	Total	258,080	100.0

* Less than 0.1 percent.

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
AuA	Aubbeenaubbee-Whitaker complex, 0 to 2 percent slopes (where drained)
AyB	Ayr loamy fine sand, 1 to 4 percent slopes
AzA	Ayrmount loamy fine sand, 0 to 2 percent slopes
BbA	Barce-Corwin complex, 0 to 2 percent slopes
BfB2	Barce-Montmorenci complex, 1 to 4 percent slopes, eroded
Bh	Barry-Gilford complex (where drained)
By	Bryce silty clay loam (where drained)
CtA	Corwin fine sandy loam, 0 to 2 percent slopes
CtB2	Corwin fine sandy loam, 2 to 6 percent slopes, eroded
Cv	Craigmile sandy loam, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
DaA	Darroch fine sandy loam, 0 to 2 percent slopes (where drained)
DcA	Darroch silt loam, 0 to 2 percent slopes (where drained)
DdA	Darroch fine sandy loam, sandy substratum, 0 to 2 percent slopes (where drained)
DgA	Darroch loam, till substratum, 0 to 2 percent slopes (where drained)
EsB	Elston Variant fine sandy loam, 1 to 3 percent slopes
FeA	Foresman fine sandy loam, 0 to 2 percent slopes
FoA	Foresman silt loam, 0 to 2 percent slopes
FoB2	Foresman silt loam, 2 to 6 percent slopes, eroded
FrA	Foresman fine sandy loam, till substratum, 0 to 2 percent slopes
FrB2	Foresman fine sandy loam, till substratum, 2 to 6 percent slopes, eroded
FtA	Foresman silt loam, till substratum, 0 to 2 percent slopes
FtB2	Foresman silt loam, till substratum, 2 to 6 percent slopes, eroded
FwA	Foresman silt loam, moderately fine substratum, 0 to 2 percent slopes
GbA	Gilboa-Odell complex, 0 to 2 percent slopes (where drained)
Gf	Gilford fine sandy loam (where drained)
GhB	Glenhall loam, 1 to 4 percent slopes
Ir	Iroquois fine sandy loam (where drained)
MeA	Martinsville-Williamstown complex, 0 to 2 percent slopes
MeB2	Martinsville-Williamstown complex, 2 to 6 percent slopes, eroded
Mp	Montgomery silty clay loam (where drained)
MrB2	Montmorenci fine sandy loam, 2 to 6 percent slopes, eroded
OkB2	Octagon-Ayr complex, 2 to 6 percent slopes, eroded
OnA	Onarga fine sandy loam, moderately wet, 0 to 2 percent slopes
OnB2	Onarga fine sandy loam, moderately wet, 2 to 6 percent slopes, eroded
OpB2	Onarga fine sandy loam, till substratum, 2 to 6 percent slopes, eroded
PaA	Papineau fine sandy loam, 0 to 1 percent slopes (where drained)
PaB	Papineau fine sandy loam, 1 to 3 percent slopes (where drained)
RtA	Ridgeville fine sandy loam, 0 to 2 percent slopes (where drained)
RuA	Ridgeville fine sandy loam, till substratum, 0 to 2 percent slopes (where drained)
Rv	Ross silt loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
SeA	Seafield fine sandy loam, 0 to 2 percent slopes (where drained)
Sf	Selma fine sandy loam (where drained)
Sg	Selma silt loam (where drained)
Sh	Selma loam, sandy substratum (where drained)
Sk	Selma silty clay loam, till substratum (where drained)
SmB	Simonin loamy sand, 1 to 3 percent slopes
SwA	Strole silty clay loam, 0 to 1 percent slopes (where drained)
SxA	Sumava-Ridgeville-Odell complex, 0 to 2 percent slopes (where drained)
SyA	Swygert silt loam, 0 to 2 percent slopes (where drained)
SzB2	Swygert Variant-Simonin complex, 2 to 6 percent slopes, eroded
WkA	Wesley fine sandy loam, 0 to 1 percent slopes (where drained)
Zg	Zadog-Granby complex (where drained)

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Bromegrass-alfalfa hay	Tall fescue-red clover hay	Tall fescue
		Bu	Bu	Bu	Tons	Tons	AUM*
Ac: Ackerman-Martisco Variant	IVw	75	27	30	---	2.5	5.0
Ad: Adrian	IVw	118	42	---	---	3.9	7.8
Af: Adrian Variant	IVw	110	38	44	---	3.6	7.2
Ap: Alganses	Vw	---	---	---	---	---	---
Ar: Aquolls	VIIIw	---	---	---	---	---	---
AuA: Aubbeenaubbee-Whitaker	IIw	116	41	46	3.8	3.8	7.6
AyB: Ayr	IIIe	90	32	40	3.0	3.0	6.0
AzA: Ayrmount	IIIs	100	35	45	3.3	3.3	6.6
BbA: Barce-Corwin	I	123	44	55	4.1	4.1	8.2
BfB2: Barce-Montmorenci	IIe	115	40	49	3.8	3.8	7.6
Bh: Barry-Gilford	IIw	120	42	55	---	4.0	8.0
BmB: Brems	IVs	70	24	32	2.3	2.3	4.6
By: Bryce	IIw	120	43	48	---	4.0	8.0
Co: Comfrey	Vw	---	---	---	---	---	---
Cr: Conrad	IIIw	105	37	47	---	3.5	7.0
CtA: Corwin	I	115	40	52	3.8	3.8	7.6
CtB2: Corwin	IIe	115	40	52	3.8	3.8	7.6
Cv: Craigmile	IIIw	110	38	45	---	3.5	7.0

See footnote at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Bromegrass-alfalfa hay	Tall fescue-red clover hay	Tall fescue
		Bu	Bu	Bu	Tons	Tons	AUM*
Cz---------------- Craigmile	Vw	---	---	---	---	---	---
DaA--------------- Darroch	IIw	135	47	54	4.4	4.4	8.8
DcA--------------- Darroch	IIw	140	50	56	4.6	4.6	9.2
DdA--------------- Darroch	IIw	120	42	48	4.0	4.0	8.0
DgA--------------- Darroch	IIw	135	48	54	4.8	4.8	9.6
EsB--------------- Elston Variant	IIe	100	35	50	3.3	3.3	6.6
FeA--------------- Foresman	I	125	44	50	4.1	4.1	8.2
FoA--------------- Foresman	I	130	45	52	4.3	4.3	8.6
FoB2-------------- Foresman	IIe	125	44	50	4.1	4.1	8.2
FrA--------------- Foresman	I	120	42	48	4.0	4.0	8.0
FrB2-------------- Foresman	IIe	115	40	46	3.8	3.8	7.6
FtA--------------- Foresman	I	130	45	52	4.3	4.3	8.6
FtB2-------------- Foresman	IIe	125	44	50	4.1	4.1	8.2
FwA--------------- Foresman	I	130	46	52	4.3	4.3	8.6
GbA--------------- Gilboa-Odell	IIw	133	46	60	4.6	4.6	9.2
Gf---------------- Gilford	IIw	120	42	54	---	4.0	8.0
GhB--------------- Glenhall	IIe	130	46	52	4.3	4.3	8.6
Gn, Gt------------ Granby	IIIw	75	30	35	---	2.5	5.0
Ho---------------- Houghton	IIIw	118	41	---	---	3.9	7.8
Ir---------------- Iroquois	IIw	140	49	56	---	4.6	9.2

See footnote at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Bromegrass-alfalfa hay	Tall fescue-red clover hay	Tall fescue
		Bu	Bu	Bu	Tons	Tons	AUM*
Ke------------- Kentland	IIIw	110	38	50	---	3.6	7.2
MeA------------ Martinsville-Williamstown	I	115	40	49	3.8	3.8	7.6
MeB2----------- Martinsville-Williamstown	IIe	110	38	46	3.6	3.6	7.2
Mh, Mk--------- Maumee	IIIw	110	38	50	---	3.6	7.2
MnC2----------- Miami	IIIe	95	33	43	3.1	3.1	6.2
MnE------------ Miami	VIe	---	---	---	2.3	2.3	4.6
Mp------------- Montgomery	IIIw	120	42	48	---	4.0	8.0
MrB2----------- Montmorenci	IIe	120	42	54	4.0	4.0	8.0
MuA------------ Morocco	IVs	80	28	36	2.6	2.6	5.2
NsA, NsB------- Nesius	IVs	70	25	31	2.3	2.3	4.6
Nw------------- Newton	Vw	---	---	---	---	---	---
OaB------------ Oakville	IVs	55	---	25	2.1	---	4.2
OaC------------ Oakville	VIs	---	---	---	1.8	---	3.6
ObB------------ Oakville	IVs	60	---	30	2.3	---	4.6
OcC2----------- Octagon	IIIe	100	35	45	3.3	---	6.6
OkB2:		104	38	49	3.6	---	7.2
Octagon--------	IIe						
Ayr------------	IIIe						
OnA------------ Onarga	IIs	105	37	47	3.5	---	7.0
OnB2----------- Onarga	IIe	100	35	40	3.3	---	6.6
OpB2----------- Onarga	IIe	110	39	49	3.6	---	7.2

See footnote at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Bromegrass-alfalfa hay	Tall fescue-red clover hay	Tall fescue
		Bu	Bu	Bu	Tons	Tons	AUM*
OrB--------------- Ormas	IIIs	65	23	32	2.2	---	4.4
PaA, PaB--------- Papineau	IIw	98	35	44	3.2	3.2	6.4
Pp--------------- Peotone	IIIw	98	38	---	---	3.2	6.4
Pt. Pits							
Pu--------------- Prochaska	IIIw	105	37	47	---	3.5	7.0
Px--------------- Prochaska	IIIw	95	33	42	---	3.2	6.4
Py--------------- Prochaska	Vw	---	---	---	---	---	---
RtA-------------- Ridgeville	IIs	115	40	53	4.6	---	9.2
RuA-------------- Ridgeville	IIw	115	40	51	4.6	4.6	9.2
Rv--------------- Ross	IIw	120	42	48	4.0	4.0	8.0
Sd--------------- Sawabash	Vw	---	---	---	---	---	---
SeA-------------- Seafield	IIw	95	33	43	3.1	3.1	6.2
Sf--------------- Selma	IIw	145	51	58	---	4.8	9.6
Sg--------------- Selma	IIw	136	44	53	---	4.5	9.0
Sh--------------- Selma	IIw	140	49	56	---	4.6	9.2
Sk--------------- Selma	IIw	150	53	60	---	5.0	10.0
SmB-------------- Simonin	IIs	95	33	43	3.1	---	6.2
SrB-------------- Sparta	IVs	50	18	23	1.7	---	3.4
SwA-------------- Strole	IIw	110	38	50	---	3.6	7.2
SxA:		114	40	52	3.8	3.8	7.6
Sumava----------	IIw						
Ridgeville------	IIs						
Odell-----------	IIw						

See footnote at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Bromegrass-alfalfa hay	Tall fescue-red clover hay	Tall fescue
		Bu	Bu	[illegible]	Tons	Tons	AUM*
SyA------------- Swygert	IIw	114	39	51	3.8	3.8	7.6
SzB2------------ Swygert Variant-Simonin	IIIe	95	33	43	3.1	---	6.2
SzC2------------ Swygert Variant-Simonin	IVe	72	25	32	2.4	---	4.8
TaA------------- Tedrow	IIIs	85	30	[illegible]	2.8	2.8	5.6
To-------------- Toto	IVw	85	22	---	---	2.4	4.8
Ud-------------- Udorthents	VIs	---	---	---	---	---	---
Wa-------------- Wallkill	IIIw	130	45	55	---	4.5	9.0
Wc-------------- Wallkill Variant	IIIw	110	39	44	---	3.6	7.2
WeA------------- Watseka	IIIs	92	31	43	3.0	3.0	6.0
WkA------------- Wesley	IIw	112	39	50	---	3.7	7.4
ZaA------------- Zaborosky	IIIs	75	26	30	2.5	2.5	5.0
ZbB:		69	---	30	2.3	2.3	4.6
Zaborosky------	IIIs						
Oakville-------	IVs						
Zg-------------- Zadog-Granby	IIIw	97	34	42	---	3.2	6.4

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 7.--CAPABILITY CLASSES AND SUBCLASSES

(Miscellaneous areas are excluded. Absence of an entry indicates no acreage)

Class	Total acreage	Major management concerns (Subclass)			
		Erosion (e)	Wetness (w)	Soil problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I	12,536	---	---	---	---
II	109,296	16,475	88,376	4,445	---
III	47,947	2,815	35,677	9,455	---
IV	74,100	200	38,525	35,375	---
V	6,576	---	6,576	---	---
VI	5,773	359	---	5,414	---
VII	---	---	---	---	---
VIII	538	---	538	---	---

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
Ac:									
Ackerman--------	2W	Slight	Severe	Severe	Severe	Red maple-----------	46	30	---
						Silver maple---------	---	---	
						White ash-----------	---	---	
						Quaking aspen--------	---	---	
						Eastern cottonwood--	---	---	
Martisco Variant--------	2W	Slight	Severe	Severe	Severe	White ash-----------	51	35	American sycamore, pin oak, swamp white oak, eastern cottonwood, red maple, silver maple, green ash.
						Red maple-----------	51	33	
						Quaking aspen--------	56	56	
						Silver maple---------	76	30	
						Eastern cottonwood--	---	---	
Ad--------------- Adrian	2W	Slight	Severe	Severe	Severe	White ash-----------	51	35	---
						Red maple-----------	51	33	
						Quaking aspen--------	56	56	
						Black willow---------	---	---	
						Silver maple---------	76	30	
Af--------------- Adrian Variant	2W	Slight	Severe	Severe	Severe	White ash-----------	51	35	Red maple, silver maple, white ash.
						Silver maple---------	76	30	
						Quaking aspen--------	44	30	
						Eastern cottonwood--	82	83	
						Pin oak-------------	50	34	
Ap--------------- Alganses	4S	Slight	Slight	Moderate	Slight	Quaking aspen--------	55	53	American sycamore, eastern cottonwood, quaking aspen.
						Silver maple---------	76	30	
						Pin oak-------------	80	62	
						American sycamore---	80	---	
						Hackberry-----------	35	---	
						Red maple-----------	51	33	
						Eastern cottonwood--	90	103	
AuA:									
Aubbeenaubbee--	4A	Slight	Slight	Slight	Slight	White oak-----------	75	57	Eastern white pine, white ash, red maple, yellow-poplar, American sycamore, green ash, white ash.
						Pin oak-------------	85	67	
						Yellow-poplar--------	85	81	
						Northern red oak----	75	57	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
AuA: Whitaker	4A	Slight	Slight	Slight	Slight	White oak	70	52	Eastern white pine, white ash, red maple, yellow-poplar, American sycamore.
						Pin oak	85	67	
						Yellow-poplar	85	81	
						Northern red oak	75	57	
Bh: Barry	5W	Slight	Severe	Severe	Severe	Pin oak	86	68	Eastern white pine, red maple, white ash, American sycamore.
						White oak	75	57	
						Northern red oak	78	60	
Gilford	4W	Slight	Severe	Severe	Severe	Pin oak	70	52	Eastern white pine, European larch, white spruce, white ash.
						Eastern white pine	55	106	
						Bigtooth aspen	70	81	
						Red maple	60	38	
BmB: Brems	4A	Slight	Slight	Slight	Slight	Northern red oak	70	52	Eastern white pine, red pine, jack pine.
						Red pine	72	134	
						Eastern white pine	65	136	
						Jack pine	70	103	
Cv, Cz: Craigmile	3W	Slight	Severe	Severe	Severe	Red maple	72	44	Eastern white pine, white ash, red maple, American sycamore, pin oak.
						Silver maple	95	46	
						White ash	72	69	
						American elm	70	---	
						Eastern cottonwood	100	128	
						American sycamore	90	---	
						Pin oak	90	72	
Gf: Gilford	4W	Slight	Severe	Severe	Severe	Pin oak	70	52	Eastern white pine, European larch, white spruce, white ash.
						Eastern white pine	55	106	
						Bigtooth aspen	70	81	
						Red maple	60	38	
Gn, Gt: Granby	4W	Slight	Severe	Severe	Severe	Pin oak	70	52	Eastern white pine, European larch, black spruce.
						Quaking aspen	70	81	
						Eastern white pine	75	166	
Ho: Houghton	2W	Slight	Severe	Severe	Severe	White ash	51	35	---
						Red maple	51	33	
						Black willow	---	---	
						Quaking aspen	56	56	
						Silver maple	76	30	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
MeA, MeB2:									
Martinsville	4A	Slight	Slight	Slight	Slight	White oak	80	62	Eastern white pine, red pine, white ash, yellow-poplar, black walnut.
						Yellow-poplar	98	104	
Williamstown	5A	Slight	Slight	Slight	Slight	White oak	85	67	Black walnut, white oak, yellow-poplar.
						Yellow-poplar	100	107	
						White ash	85	88	
Mh, Mk Maumee	4W	Slight	Severe	Slight	Severe	Pin oak	70	52	Eastern white pine, European larch, white spruce.
						Eastern white pine	55	106	
						Bigtooth aspen	70	81	
						Silver maple	---	---	
MnC2 Miami	5A	Slight	Slight	Slight	Slight	White oak	90	72	Eastern white pine, red pine, white ash, yellow-poplar, black walnut.
						Yellow-poplar	98	104	
MnE Miami	5R	Moderate	Moderate	Slight	Slight	White oak	90	72	Eastern white pine, red pine, white ash, yellow-poplar, black walnut.
						Yellow-poplar	98	104	
Mp Montgomery	5W	Slight	Severe	Severe	Severe	Pin oak	88	70	American sycamore, pin oak, green ash, red maple, eastern cottonwood, silver maple.
						White oak	75	57	
MuA Morocco	4S	Slight	Moderate	Moderate	Slight	Northern red oak	70	52	Eastern white pine, European larch, red maple, American sycamore.
						Pin oak	85	67	
						Eastern white pine	65	136	
NsA, NsB Nesius	3S	Slight	Slight	Moderate	Slight	Northern pin oak	55	38	Jack pine, eastern white pine, red pine.
						Eastern white pine	55	106	
						Red pine	55	88	
						Jack pine	57	80	
Nw Newton	4W	Slight	Severe	Severe	Severe	Pin oak	70	52	Eastern white pine, black spruce, European larch.
						Eastern white pine	55	106	
						Eastern cottonwood	70	58	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
OaB, OaC, ObB--- Oakville	4S	Slight	Moderate	Moderate	Slight	White oak----------- Red pine------------ Eastern white pine-- Jack pine-----------	70 78 85 68	52 150 196 100	Eastern white pine, red pine, jack pine.
OrB------------- Ormas	4S	Slight	Slight	Moderate	Slight	White oak----------- Yellow-poplar------- Eastern white pine-- Red pine------------	70 --- --- 78	52 --- --- 150	Eastern white pine, red pine, yellow-poplar, black walnut, European alder.
Pu, Px, Py------ Prochaska	4W	Slight	Severe	Severe	Severe	Pin oak------------- River birch--------- Red maple----------- Quaking aspen------- Silver maple-------- Eastern cottonwood--	75 46 50 55 70 85	57 30 32 53 25 91	Eastern cottonwood, European larch, silver maple, red maple, quaking aspen, eastern cottonwood.
Rv-------------- Ross	5A	Slight	Slight	Slight	Slight	Northern red oak---- Yellow-poplar------- Sugar maple--------- White oak----------- Black walnut-------- Black cherry-------- White ash-----------	86 96 85 --- --- --- ---	68 100 52 --- --- --- ---	Eastern white pine, black walnut, white ash, yellow-poplar.
Sd-------------- Sawabash	5W	Slight	Severe	Severe	Slight	Pin oak------------- American sycamore---	86 ---	68 ---	Green ash, American sycamore.
SeA------------- Seafield	3A	Slight	Slight	Slight	Slight	White oak----------- Pin oak------------- Yellow-poplar------- Northern red oak----	65 80 80 70	48 62 71 52	Eastern white pine, white ash, red maple, yellow-poplar, American sycamore, green ash.
SrB------------- Sparta	4S	Slight	Slight	Severe	Slight	Northern red oak---- Eastern white pine-- Red pine------------ Jack pine-----------	70 --- --- ---	52 --- --- ---	Red pine, eastern white pine, jack pine.
TaA------------- Tedrow	4S	Slight	Moderate	Moderate	Slight	Bur oak------------- Northern red oak---- Quaking aspen------- Green ash----------- Slippery elm-------- Red maple----------- Black oak-----------	75 --- --- --- --- --- ---	57 --- --- --- --- --- ---	Yellow-poplar, red pine, white ash, jack pine, black oak, northern red oak, white spruce.

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
To--------------- Toto	2W	Slight	Severe	Severe	Severe	Red maple------------	51	33	Red maple, quaking aspen, eastern cottonwood.
						Silver maple---------	76	30	
						Quaking aspen--------	56	56	
						Eastern cottonwood--	86	93	
						River birch----------	45	30	
						Pin oak--------------	60	43	
						Tamarack-------------	41	29	
						Northern whitecedar-	27	39	
Wa--------------- Wallkill	3W	Slight	Severe	Severe	Severe	Pin oak--------------	65	48	Red maple, green ash, eastern cottonwood, pin oak, swamp white oak.
						Red maple------------	51	33	
						White ash------------	52	37	
						Quaking aspen--------	56	56	
						Black willow---------	---	---	
						Silver maple---------	---	---	
ZbB: Zaborosky.									
Oakville--------	4S	Slight	Moderate	Moderate	Slight	White oak------------	70	52	Eastern white pine, red pine, jack pine.
						Red pine-------------	78	150	
						Eastern white pine--	85	196	
						Jack pine------------	68	100	
Zg: Zadog-----------	4W	Slight	Severe	Slight	Severe	Pin oak--------------	75	57	Eastern white pine, European larch, red maple, white spruce, silver maple.
						Quaking aspen--------	55	53	
						Eastern cottonwood--	85	91	
						Silver maple---------	70	25	
Granby----------	4W	Slight	Severe	Severe	Severe	Pin oak--------------	70	52	Eastern white pine, European larch, black spruce.
						Quaking aspen--------	70	81	
						Eastern white pine--	75	166	

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Ac:					
Ackerman	Whitebelle honeysuckle, common ninebark.	Amur honeysuckle, Amur privet, silky dogwood, nannyberry viburnum.	Tall purple willow	Golden willow, black willow.	Imperial Carolina poplar.
Martisco Variant	---	Nannyberry viburnum, Washington hawthorn.	Eastern redcedar, white spruce, Osage-orange, northern whitecedar, green ash.	Black willow	---
Ad Adrian	Whitebelle honeysuckle, common ninebark.	Amur honeysuckle, Amur privet, silky dogwood, nannyberry viburnum.	Tall purple willow	Black willow, golden willow.	Imperial Carolina poplar.
Af Adrian Variant	Common ninebark, whitebelle honeysuckle.	Amur honeysuckle, Amur privet, silky dogwood, nannyberry viburnum.	Tall purple willow	Golden willow, black willow.	Imperial Carolina poplar.
Ap Algansee	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Ar. Aquolls					
AuA:					
Aubbeenaubbee	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Whitaker	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, Austrian pine, blue spruce, Washington hawthorn, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
AyB: Ayr	---	Amur privet, Washington hawthorn, Amur honeysuckle, American cranberrybush.	Austrian pine, northern whitecedar, eastern redcedar, Osage-orange.	Eastern white pine, red pine, Norway spruce.	---
AzA: Ayrmount	Siberian peashrub	Autumn-olive, Amur honeysuckle, eastern redcedar, lilac, radiant crabapple, Washington hawthorn.	Austrian pine, jack pine, red pine.	Eastern white pine	---
BbA:					
Barce	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Corwin	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
BfB2:					
Barce	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Montmorenci	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Bh:					
Barry	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, white fir, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
Gilford	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Norway spruce, northern whitecedar, Washington hawthorn, blue spruce, white fir, Austrian pine.	Eastern white pine	Pin oak.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
BmB: Brems	Siberian peashrub	Eastern redcedar, radiant crabapple, Washington hawthorn, autumn-olive, Amur honeysuckle, lilac.	Austrian pine, jack pine, red pine.	Eastern white pine	---
By: Bryce	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
Co. Comfrey					
Cr: Conrad	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
CtA, CtB2: Corwin	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Cv, Cz: Craigmile	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
DaA, DcA: Darroch	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
DdA: Darroch	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Austrian pine, northern whitecedar, white fir, Washington hawthorn, blue spruce.	Norway spruce	Eastern white pine, pin oak.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
DgA: Darroch	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
EsB: Elston Variant	Siberian peashrub	Washington hawthorn, lilac, eastern redcedar, autumn-olive, radiant crabapple, Amur honeysuckle.	Eastern white pine, jack pine, Austrian pine, red pine.	---	---
FeA, FoA, FoB2: Foresman	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
FrA, FrB2: Foresman	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Northern whitecedar, white fir, Washington hawthorn, blue spruce.	Austrian pine, Norway spruce.	Eastern white pine, pin oak.
FtA, FtB2, FwA: Foresman	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
GbA:					
Gilboa	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Odell	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, Austrian pine, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Gf: Gilford	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Norway spruce, northern whitecedar, Washington hawthorn, blue spruce, white fir, Austrian pine.	Eastern white pine	Pin oak.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
GhB: Glenhall	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Gn, Gt: Granby	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
Ho: Houghton	Whitebelle honeysuckle, common ninebark.	Amur honeysuckle, Amur privet, silky dogwood, nannyberry viburnum.	Tall purple willow	Golden willow, black willow.	Imperial Carolina poplar.
Ir: Iroquois	Silky dogwood	Amur privet, Amur honeysuckle, American cranberrybush.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, Washington hawthorn.	Pin oak, eastern white pine.	Carolina poplar.
Ke: Kentland	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Austrian pine, white fir, northern whitecedar, Washington hawthorn, Norway spruce, blue spruce.	Eastern white pine	Pin oak.
MeA, MeB2:					
Martinsville	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Williamstown	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Mh, Mk: Maumee	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
MnC2, MnE----------- Miami	---	Amur honeysuckle, Amur privet, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Mp---------------- Montgomery	---	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Northern whitecedar, Norway spruce, Austrian pine, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
MrB2-------------- Montmorenci	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Northern whitecedar, white fir, Washington hawthorn, blue spruce.	Austrian pine, Norway spruce.	Eastern white pine, pin oak.
MuA--------------- Morocco	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
NsA, NsB---------- Nesius	Lilac, Siberian peashrub.	Washington hawthorn, eastern redcedar, Amur honeysuckle, sargent crabapple.	Eastern white pine, red pine, green ash, Austrian pine, jack pine, honeylocust.	---	---
Nw---------------- Newton	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
OaB, OaC, ObB----- Oakville	Siberian peashrub	Eastern redcedar, lilac, radiant crabapple, autumn-olive, Washington hawthorn, Amur honeysuckle.	Red pine, Austrian pine, jack pine.	Eastern white pine	---
OcC2-------------- Octagon	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
OkB2:					
Octagon	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Ayr	---	Amur privet, Washington hawthorn, Amur honeysuckle, American cranberrybush.	Austrian pine, northern whitecedar, eastern redcedar, Osage-orange.	Eastern white pine, red pine, Norway spruce.	---
OnA, OnB2 Onarga	---	Amur honeysuckle, Amur privet, American cranberrybush, Washington hawthorn, silky dogwood.	Austrian pine, Osage-orange, eastern redcedar, northern whitecedar.	Eastern white pine, Norway spruce, red pine.	---
OpB2 Onarga	---	Amur honeysuckle, Amur privet, American cranberrybush, Washington hawthorn.	Austrian pine, Osage-orange, eastern redcedar, red pine, northern whitecedar.	Eastern white pine, Norway spruce.	---
OrB Ormas	Siberian peashrub	Eastern redcedar, lilac, radiant crabapple, autumn-olive, Washington hawthorn, Amur honeysuckle.	Red pine, Austrian pine, jack pine.	Eastern white pine	---
PaA, PaB Papineau	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Pp Peotone	---	Amur privet, American cranberrybush.	Norway spruce, Austrian pine, northern whitecedar, Washington hawthorn.	Eastern white pine	Pin oak.
Pt. Pits					
Pu, Px, Py Prochaska	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
RtA: Ridgeville	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
RuA: Ridgeville	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Austrian pine, northern whitecedar, white fir, Washington hawthorn, blue spruce.	Norway spruce	Eastern white pine, pin oak.
Rv: Ross	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern whitecedar, blue spruce, white fir, Austrian pine.	Norway spruce	Pin oak, eastern white pine.
Sd: Sawabash	---	Washington hawthorn, nannyberry viburnum.	Osage-orange, green ash, northern whitecedar, eastern redcedar, white spruce.	Black willow	---
SeA: Seafield	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Sf, Sg: Selma	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
Sh: Selma	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Austrian pine, white fir, northern whitecedar, Washington hawthorn, Norway spruce, blue spruce.	Eastern white pine	Pin oak.
Sk: Selma	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
SmB---------------- Simonin	Siberian peashrub	Eastern redcedar, radiant crabapple, Washington hawthorn, autumn-olive, Amur honeysuckle, lilac.	Austrian pine, jack pine, red pine.	Eastern white pine	---
SrB---------------- Sparta	Siberian peashrub	Amur honeysuckle, lilac, eastern redcedar, radiant crabapple, Washington hawthorn, autumn-olive.	Red pine, jack pine, Austrian pine.	Eastern white pine	---
SwA---------------- Strole	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
SxA:					
Sumava------------	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
Ridgeville--------	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
Odell-------------	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, Austrian pine, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
SyA---------------- Swygert	---	American cranberrybush, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osage-orange, green ash, Austrian pine.	Pin oak-----------	---

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
SzB2, SzC2:					
Swygert Variant	---	Washington hawthorn, Amur honeysuckle, Amur privet, American cranberrybush, eastern redcedar, arrowwood.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
Simonin	Siberian peashrub	Eastern redcedar, radiant crabapple, Washington hawthorn, autumn-olive, Amur honeysuckle, lilac.	Austrian pine, jack pine, red pine.	Eastern white pine	---
TaA: Tedrow	---	Silky dogwood, American cranberrybush, Amur privet, Amur honeysuckle.	Austrian pine, northern whitecedar, white fir, blue spruce, Washington hawthorn.	Norway spruce	Pin oak, eastern white pine.
To: Toto	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
Ud. Udorthents					
Wa: Wallkill	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
Wc: Wallkill Variant	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
WeA: Watseka	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
WkA: Wesley	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
ZaA: Zaborosky	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
ZbB:					
Zaborosky	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Oakville	Siberian peashrub	Eastern redcedar, lilac, radiant crabapple, autumn-olive, Washington hawthorn, Amur honeysuckle.	Red pine, Austrian pine, jack pine.	Eastern white pine	---
Zg:					
Zadog	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
Granby	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.

TABLE 10.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ac:					
Ackerman	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Martisco Variant	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Ad Adrian	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Af Adrian Variant	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Ap Algansee	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
Ar Aquolls	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
AuA:					
Aubbeenaubbee	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Whitaker	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
AyB Ayr	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
AsA Ayrmount	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Slight.
BbA:					
Barce	Slight	Slight	Slight	Slight	Slight.
Corwin	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight	Slight.
BfB2:					
Barce	Slight	Slight	Moderate: slope.	Slight	Slight.
Montmorenci	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight	Slight.
Bh:					
Barry	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Bh: Gilford	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
BmB Brems	Moderate: wetness, too sandy.	Moderate: wetness, too sandy.	Moderate: slope, small stones, too sandy.	Moderate: too sandy.	Moderate: droughty.
By Bryce	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Co Comfrey	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Cr Conrad	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
CtA Corwin	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight	Slight.
CtB2 Corwin	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Slight	Slight.
Cv, Cz Craigmile	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
OaA, DcA Darroch	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
DdA Darroch	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
DgA Darroch	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
EsB Elston Variant	Slight	Slight	Moderate: slope.	Slight	Slight.
FeA, FoA Foresman	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight	Slight.
FoB2 Foresman	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
FrA Foresman	Slight	Slight	Slight	Slight	Slight.
FrB2 Foresman	Slight	Slight	Moderate: slope.	Slight	Slight.
FtA Foresman	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight	Slight.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
FtB2------------------- Foresman	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----------	Slight.
FwA------------------- Foresman	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight----------	Slight.
GhA:					
Gilboa---------------	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Odell----------------	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Gf-------------------- Gilford	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
GhB------------------- Glenhall	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
Gn, Gt---------------- Granby	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Ho-------------------- Houghton	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Ir-------------------- Iroquois	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Ke-------------------- Kentland	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
MeA:					
Martinsville---------	Slight----------	Slight----------	Moderate: small stones.	Slight----------	Slight.
Williamstown---------	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
MeB2:					
Martinsville---------	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
Williamstown---------	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
Mh, Mk---------------- Maumee	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
MnC2------------------ Miami	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
MnE: Miami	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Mp: Montgomery	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
MrB2: Montmorenci	Slight	Slight	Moderate: slope.	Slight	Slight.
MuA: Morocco	Severe: wetness.	Moderate: wetness, too sandy.	Severe: wetness.	Moderate: wetness, too sandy.	Moderate: wetness, droughty.
NsA: Nesius	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: droughty.
NsB: Nesius	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
Nw: Newton	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
OaB: Oakville	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
OaC: Oakville	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty, slope.
ObB: Oakville	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
OcC2: Octagon	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
OkB2:					
Octagon	Slight	Slight	Moderate: slope.	Slight	Slight.
Ayr	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
OnA: Onarga	Slight	Slight	Slight	Slight	Slight.
OnB2, OpB2: Onarga	Slight	Slight	Moderate: slope.	Slight	Slight.
OrB: Ormas	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
PaA, PaB: Papineau	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Pp: Peotone	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Pt. Pits					
Pu: Prochaska	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Px, Py: Prochaska	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
RtA, RuA: Ridgeville	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Rv: Ross	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
Sd: Sawabash	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
SeA: Seafield	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Sf, Sg, Sh, Sk: Selma	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
SmB: Simonin	Moderate: percs slowly, too sandy.	Moderate: too sandy, percs slowly.	Moderate: too sandy, percs slowly.	Moderate: too sandy.	Moderate: droughty.
SrB: Sparta	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, small stones.	Moderate: too sandy.	Moderate: droughty.
SwA: Strole	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
SxA:					
Sumava	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Ridgeville	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Odell	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
SyA: Swygert	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness.
SnB2:					
Swygert Variant	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight	Slight.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
SzB2:					
Simonin	Moderate: percs slowly, too sandy.	Moderate: too sandy, percs slowly.	Moderate: slope, too sandy, percs slowly.	Moderate: too sandy.	Moderate: droughty.
SsC2:					
Swygert Variant	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Slight	Moderate: slope.
Simonin	Moderate: slope, percs slowly, too sandy.	Moderate: slope, too sandy, percs slowly.	Severe: slope.	Moderate: too sandy.	Moderate: droughty, slope.
TaA: Tedrow	Severe: wetness.	Moderate: wetness, too sandy.	Severe: wetness.	Moderate: wetness, too sandy.	Moderate: wetness, droughty.
To: Toto	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Ud: Udorthents	Slight	Slight	Moderate: slope.	Slight	Moderate: large stones.
Wa: Wallkill	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, erodes easily.	Severe: ponding.
Wc: Wallkill Variant	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
WeA: Watseka	Severe: wetness.	Moderate: wetness, too sandy.	Severe: wetness.	Moderate: wetness, too sandy.	Moderate: wetness, droughty.
WkA: Wesley	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
ZaA: Zaborosky	Severe: wetness, too sandy.	Severe: too sandy.	Severe: too sandy, wetness.	Severe: too sandy.	Moderate: wetness, droughty.
ZbB:					
Zaborosky	Severe: wetness, too sandy.	Severe: too sandy.	Severe: too sandy, wetness.	Severe: too sandy.	Moderate: wetness, droughty.
Oakville	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
Zg:					
Zadog	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Granby	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

TABLE 11.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Ac:										
Ackerman	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Martisco Variant	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Ad: Adrian	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Af: Adrian Variant	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Ap: Algansee	Very poor.	Fair	Fair	Fair	Fair	Fair	Fair	Poor	Fair	Fair.
Ar. Aquolls										
AuA:										
Aubbeenaubbee	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Whitaker	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
AyB: Ayr	Fair	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
AzA: Ayrmount	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
BbA:										
Barce	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Corwin	Good	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor.
BfB2:										
Barce	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Montmorenci	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Bh:										
Barry	Good	Good	Fair	Fair	Fair	Good	Good	Good	Fair	Good.
Gilford	Fair	Poor	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.
BmB: Brems	Poor	Fair	Fair	Poor	Poor	Poor	Very poor.	Fair	Poor	Poor.
By: Bryce	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
Co: Comfrey	Poor	Poor	Fair	Very poor.	Very poor.	Good	Good	Poor	Poor	Good.

TABLE 11.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Cr----------------- Conrad	Fair	Poor	Poor	Poor	Poor	Poor	Good	Fair	Poor	Fair.
CtA, CtB2---------- Corwin	Good	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor.
Cv, Cz------------- Craigmile	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
DaA, DoA, DdA, DgA- Darroch	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
EsB---------------- Elston Variant	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
FeA, FoA----------- Foresman	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
FoB2--------------- Foresman	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
FrA---------------- Foresman	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
FrB2, FtA, FtB2, FwA--------------- Foresman	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GbA:										
Gilboa------------	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Odell-------------	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Gf----------------- Gilford	Fair	Poor	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.
GhB---------------- Glenhall	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Gn, Gt------------- Granby	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Ho----------------- Houghton	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Ir----------------- Iroquois	Fair	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
Ke----------------- Kentland	Poor	Poor	Poor	Poor	Poor	Poor	Good	Poor	Poor	Fair.
MeA:										
Martinsville------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Williamstown------	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
MeB2:										
Martinsville------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

TABLE 11.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
MeB2:										
Williamstown	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Mh, Mk: Maumee	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
MnC2: Miami	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MnE: Miami	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Mp: Montgomery	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
MrB2: Montmorenci	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MuA: Morocco	Poor	Fair	Good	Fair	Fair	Fair	Very poor.	Fair	Fair	Poor.
NsA, NsB: Nesius	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
Nw: Newton	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
OaB: Oakville	Poor	Poor	Fair	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
OaC: Oakville	Poor	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
ObB: Oakville	Poor	Poor	Fair	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
OcC2: Octagon	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
OkB2:										
Octagon	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ayr	Fair	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
OnA: Onarga	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
OnB2: Onarga	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
OpB2: Onarga	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
OrB: Ormas	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
PaA, PaB: Papineau	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.

TABLE 11.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Pp------------------ Peotone	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Pt. Pits										
Pu, Px, Py---------- Prochaska	Poor	Poor	Poor	Poor	Poor	Fair	Good	Poor	Poor	Fair.
RtA, RuA------------ Ridgeville	Good	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
Rv------------------ Ross	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Sd------------------ Sawabash	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Fair	Poor	Fair.
SeA----------------- Seafield	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Sf, Sg, Sh---------- Selma	Good	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
Sk------------------ Selma	Good	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
SmB----------------- Simonin	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
SrB----------------- Sparta	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
SwA----------------- Strole	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
SxA:										
Sumava-------------	Good	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
Ridgeville---------	Good	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
Odell--------------	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
SyA----------------- Swygert	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
SzB2:										
Swygert Variant----	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Simonin------------	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
SzC2:										
Swygert Variant----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Simonin------------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
TaA----------------- Tedrow	Poor	Fair	Good	Fair	Fair	Fair	Fair	Fair	Fair	Fair.

TABLE 11.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
To----------------- Toto	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Ud----------------- Udorthents	Poor	Poor	Fair	Good	Good	Poor	Very poor.	Poor	Fair	Very poor.
Wa----------------- Wallkill	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Wc----------------- Wallkill Variant	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
WeA---------------- Watseka	Fair	Fair	Good	Good	Good	Fair	Poor	Fair	Good	Poor.
WkA---------------- Wesley	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
ZaA---------------- Zaborosky	Poor	Poor	Good	Fair	Fair	Poor	Fair	Fair	Fair	Poor.
ZbB: Zaborosky----------	Poor	Poor	Good	Fair	Fair	Poor	Fair	Fair	Fair	Poor.
Oakville-----------	Poor	Poor	Fair	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
Zg: Zadog--------------	Poor	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
Granby-------------	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.

TABLE 12.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ac:						
Ackerman	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding, excess humus.
Martisco Variant	Severe: cutbanks cave, excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: ponding, frost action.	Severe: ponding.
Ad: Adrian	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, ponding.	Severe: subsides, ponding.	Severe: subsides, ponding.	Severe: subsides, ponding, frost action.	Severe: ponding, excess humus.
Af: Adrian Variant	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding, excess humus.
Ap: Algansee	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.
Ar: Aquolls	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
AuA:						
Aubbeenaubbee	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
Whitaker	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
AyB: Ayr	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Moderate: droughty.
AzA: Ayrmount	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Moderate: frost action.	Slight.
BbA:						
Barce	Moderate: dense layer, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Moderate: frost action, shrink-swell.	Slight.
Corwin	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, low strength, wetness.	Slight.
BfB2:						
Barce	Moderate: dense layer, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Moderate: frost action, shrink-swell.	Slight.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
BfB2:						
Montmorenci-------	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, shrink-swell.	Slight.
Bh:						
Barry-------------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
Gilford-----------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
BmB--------------- Brems	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty.
By---------------- Bryce	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
Co---------------- Comfrey	Severe: excess humus, wetness.	Severe: flooding, wetness, low strength.	Severe: flooding, wetness.	Severe: flooding, wetness, low strength.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
Cr---------------- Conrad	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
CtA--------------- Corwin	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, low strength, wetness.	Slight.
CtB2-------------- Corwin	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Moderate: shrink-swell, low strength, wetness.	Slight.
Cv, Cz------------ Craigmile	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding, frost action.	Severe: ponding, flooding.
DaA, DcA, DdA----- Darroch	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
DgA--------------- Darroch	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
EsB--------------- Elston Variant	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Moderate: frost action.	Slight.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
FeA, FoA---------- Foresman	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength, frost action.	Slight.
FoB2-------------- Foresman	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength, frost action.	Slight.
FrA--------------- Foresman	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
FrB2-------------- Foresman	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
FtA--------------- Foresman	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strengtb, frost action.	Slight.
FtB2-------------- Foresman	Severe: cuthanks cave.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength, frost action.	Slight.
FwA--------------- Foresman	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength, frost action.	Slight.
GbA:						
Gilboa-----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Moderate: wetness.
Odell------------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
Gf---------------- Gilford	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
GhB--------------- Glenhall	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: frost action.	Slight.
Gn, Gt------------ Granby	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Ho---------------- Houghton	Severe: excess humus, ponding.	Severe: subsides, ponding.	Severe: subsides, ponding.	Severe: subsides, ponding.	Severe: subsides, ponding, frost action.	Severe: ponding, excess humus.
Ir---------------- Iroquois	Severe: ponding.	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ke: Kentland	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
MeA: Martinsville	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Moderate: frost action, shrink-swell.	Slight.
Williamstown	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, frost action.	Moderate: wetness.
MeB2: Martinsville	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Moderate: frost action, shrink-swell.	Slight.
Williamstown	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Moderate: wetness.
Mh, Mk: Maumee	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
MnC2: Miami	Moderate: slope, dense layer.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
MnE: Miami	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
Mp: Montgomery	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, shrink-swell.	Severe: ponding.
MrB2: Montmorenci	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness.	Moderate: shrink-swell, slope.	Severe: low strength, shrink-swell.	Slight.
MuA: Morocco	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
NsA, NsB: Nesius	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
Nw: Newton	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
OaB: Oakville	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
OaC: Oakville	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
ObB: Oakville	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
OcC2: Octagon	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope.
OkB2:						
Octagon	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength.	Slight.
Ayr	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Moderate: droughty.
OnA: Onarga	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Moderate: frost action.	Slight.
OnB2, OpB2: Onarga	Severe: cutbanks cave.	Slight	Moderate: wetness.	Moderate: slope.	Moderate: frost action.	Slight.
OrB: Ormas	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Moderate: droughty.
PaA, PaB: Papineau	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
Pp: Peotone	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
Pt. Pits						
Pu: Prochaska	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.
Px, Py: Prochaska	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding.	Severe: ponding, flooding.
RtA: Ridgeville	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
RuA: Ridgeville	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness.
Rv: Ross	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Sd: Sawabash	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
SeA: Seafield	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
Sf, Sg, Sh, Sk: Selma	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
SmB: Simonin	Severe: cutbanks cave.	Slight	Severe: shrink-swell.	Slight	Moderate: frost action.	Moderate: droughty.
SrB: Sparta	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
SwA: Strole	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Moderate: wetness.
SxA:						
Sumava	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness.
Ridgeville	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
Odell	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
SyA: Swygert	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
SzB2:						
Swygert Variant	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
Simonin	Severe: cutbanks cave.	Slight	Severe: shrink-swell.	Moderate: slope.	Moderate: frost action.	Moderate: droughty.
SzC2:						
Swygert Variant	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope.
Simonin	Severe: cutbanks cave.	Moderate: slope.	Severe: shrink-swell.	Severe: slope.	Moderate: slope, frost action.	Moderate: droughty, slope.
TaA: Tedrow	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
To: Toto	Severe: cutbanks cave, excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: ponding, frost action.	Severe: ponding, excess humus.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ud. Udorthents						
Wa----------------- Wallkill	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
Wc----------------- Wallkill Variant	Severe: excess humus, ponding.	Severe: ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
WeA---------------- Watseka	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
WkA---------------- Wesley	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
ZaA---------------- Zaborosky	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
ZbB:						
Zaborosky----------	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
Oakville-----------	Severe: cutbanks cave.	Slight------------	Moderate: wetness.	Moderate: slope.	Slight------------	Moderate: droughty.
Zg:						
Zadog--------------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
Granby-------------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

TABLE 13.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ac:					
Ackerman-----------	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Martisco Variant---	Severe: ponding, percs slowly, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Ad----------------- Adrian	Severe: subsides, ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Af----------------- Adrian Variant	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Ap----------------- Algansee	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
Ar----------------- Aquolls	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
AuA:					
Aubbeenaubbee------	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: wetness.
Whitaker-----------	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
AyB---------------- Ayr	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
AzA---------------- Ayrmount	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy.
BbA:					
Barce--------------	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: small stones, wetness.
Corwin-------------	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.

TABLE 13.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
BfB2:					
Barce	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: small stones, wetness.
Montmorenci	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
Bh:					
Barry	Severe: ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: ponding.
Gilford	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: ponding, thin layer.
BmB: Brems	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
By: Bryce	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Co: Comfrey	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Cr: Conrad	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: too sandy, ponding, seepage.
CtA, CtB2: Corwin	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
Cv, Cz: Craigmile	Severe: flooding, ponding, poor filter.	Severe: seepage, flooding, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: seepage, too sandy, ponding.
DaA: Darroch	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: wetness.	Poor: too sandy, wetness.
DcA: Darroch	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too sandy.	Severe: wetness.	Poor: too sandy, wetness.
DdA: Darroch	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
DgA: Darroch	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too sandy.	Severe: wetness.	Poor: too sandy, wetness.

TABLE 13.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
EsB: Elston Variant	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
FeA, FoA, FoB2: Foresman	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: thin layer.
FrA, FrB2: Foresman	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
FtA, FtB2, FwA: Foresman	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: thin layer.
GbA:					
Gilboa	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Odell	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
Gf: Gilford	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: ponding, thin layer.
GhB: Glenhall	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Fair: too clayey, wetness, thin layer.
Gn, Gt: Granby	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Ho: Houghton	Severe: subsides, ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
Ir: Iroquois	Severe: ponding, percs slowly.	Slight	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Ke: Kentland	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: too sandy, ponding.
MeA:					
Martinsville	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Fair: thin layer.

TABLE 13.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MeA:					
Williamstown	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey, wetness.
MeB2:					
Martinsville	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Fair: thin layer.
Williamstown	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey, wetness.
Mh, Mk: Maumee	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
MnC2: Miami	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
MnE: Miami	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Mp: Montgomery	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
MrB2: Montmorenci	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
MuA: Morocco	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
NsA, NsB: Nesius	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy.
Nw: Newton	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
OaB: Oakville	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
OaC: Oakville	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
ObB: Oakville	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.

TABLE 13.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
OcC2----------------- Octagon	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
OkB2:					
Octagon------------	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight------------	Fair: too clayey.
Ayr-----------------	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
OnA, OnB2----------- Onarga	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: wetness, thin layer.
OpB2----------------- Onarga	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: thin layer.
OrB------------------ Ormas	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: thin layer.
PaA, PaB------------- Papineau	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Pp------------------- Peotone	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Pt. Pits					
Pu------------------- Prochaska	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Px, Py--------------- Prochaska	Severe: flooding, ponding, poor filter.	Severe: seepage, flooding, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: seepage, too sandy, ponding.
RtA------------------ Ridgeville	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: wetness.	Poor: seepage, too sandy, wetness.
RuA------------------ Ridgeville	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: wetness.
Rv------------------- Ross	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Good.

TABLE 13.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Sd------------------ Sawabash	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: ponding.
SeA------------------ Seafield	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, wetness.
Sf------------------ Selma	Severe: ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: ponding.
Sg, Sh-------------- Selma	Severe: ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: ponding.	Poor: ponding.
Sk------------------ Selma	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding, thin layer.
SmB----------------- Simonin	Severe: wetness, percs slowly, poor filter.	Severe: seepage.	Severe: wetness, too clayey.	Severe: seepage, wetness.	Poor: too clayey, hard to pack.
SrB----------------- Sparta	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
SwA----------------- Strole	Severe: wetness, percs slowly.	Slight-----------	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
SxA:					
Sumava--------------	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: wetness.
Ridgeville----------	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: wetness.	Poor: seepage, too sandy, wetness.
Odell---------------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
SyA----------------- Swygert	Severe: wetness, percs slowly.	Slight-----------	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
SzB2:					
Swygert Variant----	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.

TABLE 13.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
SzB2:					
Simonin	Severe: wetness, percs slowly, poor filter.	Severe: seepage.	Severe: wetness, too clayey.	Severe: seepage, wetness.	Poor: too clayey, hard to pack.
SzC2:					
Swygert Variant	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
Simonin	Severe: wetness, percs slowly, poor filter.	Severe: seepage, slope.	Severe: wetness, too clayey.	Severe: seepage, wetness.	Poor: too clayey, hard to pack.
TaA Tedrow	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
To Toto	Severe: ponding, percs slowly, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Ud. Udorthents					
Wa Wallkill	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: ponding.
Wc Wallkill Variant	Severe: ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
WeA Watseka	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: wetness, seepage, too sandy.	Severe: seepage, wetness.	Poor: too sandy, wetness, seepage.
WkA Wesley	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: wetness.
ZaA Zaborosky	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, wetness.
ZbB:					
Zaborosky	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, wetness.

TABLE 13.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
ZbB:					
Oakville-----------	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
Zg:					
Zadog--------------	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Granby-------------	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.

TABLE 14.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ac:				
Ackerman	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Martisco Variant	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
Ad: Adrian	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
Af: Adrian Variant	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Ap: Algansee	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
Ar: Aquolls	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
AuA:				
Aubbeenaubbee	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Whitaker	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
AyB: Ayr	Good	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy.
AzA: Ayrmount	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
BbA:				
Barce	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Corwin	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
BfB2:				
Barce	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Montmorenci	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, small stones.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Bh:				
Barry	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, wetness.
Gilford	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
BmB Brems	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
By Bryce	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Co Comfrey	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Cr Conrad	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
CtA, CtB2 Corwin	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Cv, Cz Craigmile	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
DaA, DcA Darroch	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, thin layer.
DdA Darroch	Fair: wetness.	Probable	Improbable: too sandy.	Fair: too clayey.
DgA Darroch	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
EsB Elston Variant	Fair: wetness.	Probable	Improbable: too sandy.	Fair: small stones.
FeA, FoA, FoB2 Foresman	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, thin layer.
FrA, FrB2 Foresman	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
FtA, FtB2 Foresman	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, thin layer.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
FwA-------------------- Foresman	Fair: shrink-swell, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, thin layer.
GbA:				
Gilboa----------------	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Odell-----------------	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, small stones.
Gf--------------------- Gilford	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: wetness.
GhB-------------------- Glenhall	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, area reclaim.
Gn--------------------- Granby	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy, wetness.
Gt--------------------- Granby	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: wetness.
Ho--------------------- Houghton	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
Ir--------------------- Iroquois	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Ke--------------------- Kentland	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
MeA:				
Martinsville----------	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Williamstown----------	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey.
MeB2:				
Martinsville----------	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Williamstown----------	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Mh, Mk: Maumee	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
MnC2: Miami	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, slope, too clayey.
MnE: Miami	Fair: slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Mp: Montgomery	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey.
MrB2: Montmorenci	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
MuA: Morocco	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
NsA, NsB: Nesius	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
Nw: Newton	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
OaB, OaC, ObB: Oakville	Good	Probable	Improbable: too sandy.	Poor: too sandy.
OcC2: Octagon	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
OkB2:				
Octagon	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Ayr	Good	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy.
OnA, OnB2: Onarga	Fair: wetness.	Probable	Improbable: too sandy.	Good.
OpB2: Onarga	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, thin layer.
OrB: Ormas	Good	Probable	Improbable: too sandy.	Poor: too sandy.
PaA, PaB: Papineau	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Pp------------------- Peotone	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Pt. Pits				
Pu, Px, Py------------ Prochaska	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy, wetness.
RtA------------------ Ridgeville	Fair: wetness.	Probable-------------	Improbable: too sandy.	Good.
RuA------------------ Ridgeville	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Rv------------------- Ross	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Good.
Sd------------------- Sawabash	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
SeA------------------ Seafield	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
Sf, Sg--------------- Selma	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Sh------------------- Selma	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: wetness.
Sk------------------- Selma	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
SmB------------------ Simonin	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
SrB------------------ Sparta	Good-----------------	Probable-------------	Improbable: too sandy.	Poor: too sandy.
SwA------------------ Strole	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
SxA:				
Sumava---------------	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Ridgeville-----------	Fair: wetness.	Probable-------------	Improbable: too sandy.	Good.
Odell----------------	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
SyA------------------- Swygert	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
SzB2, SzC2: Swygert Variant------	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Simonin--------------	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
TaA------------------- Tedrow	Fair: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy.
To-------------------- Toto	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: excess humus, wetness.
Ud. Udorthents				
Wa-------------------- Wallkill	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Wc-------------------- Wallkill Variant	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: too clayey, wetness.
WeA------------------- Watseka	Fair: wetness.	Probable-------------	Improbable: too sandy.	Fair: too sandy.
WkA------------------- Wesley	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
ZaA------------------- Zaborosky	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
ZbB: Zaborosky------------	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
Oakville-------------	Good-----------------	Probable-------------	Improbable: too sandy.	Poor: too sandy.
Zg: Zadog----------------	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy, wetness.
Granby---------------	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: wetness.

TABLE 15.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Ac:						
Ackerman	Severe: seepage.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly, frost action.	Ponding, soil blowing, percs slowly.	Ponding, too sandy, soil blowing.	Wetness, percs slowly.
Martisco Variant	Severe: seepage.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly, frost action.	Ponding, soil blowing, percs slowly.	Ponding, too sandy, soil blowing.	Wetness, percs slowly.
Ad: Adrian	Severe: seepage.	Severe: slow refill, cutbanks cave.	Ponding, subsides, frost action.	Ponding, soil blowing, rooting depth.	Ponding, too sandy, soil blowing.	Wetness, rooting depth.
Af: Adrian Variant	Severe: seepage.	Severe: slow refill, cutbanks cave.	Ponding, subsides, frost action.	Ponding, soil blowing.	Ponding, too sandy, soil blowing.	Wetness.
Ap: Algansee	Severe: seepage.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty.	Wetness, too sandy, soil blowing.	Wetness, droughty.
Ar: Aquolls	Slight	Slight	Ponding	Ponding	Ponding	Wetness.
AuA:						
Aubbeenaubbee	Severe: seepage.	Severe: slow refill.	Frost action	Wetness, soil blowing.	Wetness, soil blowing.	Wetness.
Whitaker	Moderate: seepage.	Moderate: slow refill, cutbanks cave.	Frost action	Wetness, soil blowing.	Erodes easily, wetness, soil blowing.	Wetness, erodes easily.
AyB: Ayr	Severe: seepage.	Severe: no water.	Deep to water	Droughty, fast intake.	Erodes easily, too sandy, soil blowing.	Erodes easily, droughty.
AzA: Ayrmount	Severe: seepage.	Severe: cutbanks cave.	Cutbanks cave	Wetness, fast intake, soil blowing.	Wetness, too sandy, soil blowing.	Favorable.
BbA:						
Barce	Moderate: seepage.	Severe: slow refill.	Deep to water	Favorable	Favorable	Favorable.
Corwin	Moderate: seepage.	Severe: slow refill.	Favorable	Wetness, rooting depth.	Erodes easily, wetness.	Erodes easily, rooting depth.
BfB2:						
Barce	Moderate: seepage.	Severe: slow refill.	Deep to water	Favorable	Favorable	Favorable.
Montmorenci	Moderate: seepage.	Severe: slow refill.	Frost action	Wetness, rooting depth.	Wetness	Rooting depth.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Bh:						
Barry	Severe: seepage.	Moderate: slow refill.	Ponding, frost action.	Ponding, soil blowing.	Ponding, soil blowing.	Wetness.
Gilford	Severe: seepage.	Severe: cutbanks cave.	Ponding, frost action, cutbanks cave.	Ponding, soil blowing.	Ponding, too sandy, soil blowing.	Wetness.
BmB Brems	Severe: seepage.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty.	Wetness, too sandy, soil blowing.	Droughty, rooting depth.
By Bryce	Slight	Severe: slow refill.	Ponding, percs slowly, frost action.	Ponding, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
Co Comfrey	Moderate: seepage.	Moderate: slow refill.	Flooding, frost action.	Wetness, flooding.	Wetness	Wetness.
Cr Conrad	Severe: seepage.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty.
CtA Corwin	Moderate: seepage.	Moderate: deep to water, slow refill.	Favorable	Wetness, soil blowing.	Wetness, soil blowing.	Favorable.
CtB2 Corwin	Moderate: seepage, slope.	Moderate: deep to water, slow refill.	Slope	Slope, wetness, soil blowing.	Wetness, soil blowing.	Favorable.
Cv Craigmile	Severe: seepage.	Severe: cutbanks cave.	Ponding, flooding, frost action.	Ponding, soil blowing, flooding.	Erodes easily, ponding, too sandy.	Wetness, erodes easily.
Cs Craigmile	Severe: seepage.	Severe: cutbanks cave.	Ponding, flooding, frost action.	Ponding, flooding.	Erodes easily, ponding, too sandy.	Wetness, erodes easily.
DaA Darroch	Moderate: seepage.	Severe: slow refill, cutbanks cave.	Frost action, cutbanks cave.	Wetness, soil blowing.	Erodes easily, wetness, too sandy.	Wetness, erodes easily.
DcA Darroch	Moderate: seepage.	Severe: slow refill, cutbanks cave.	Frost action, cutbanks cave.	Wetness	Erodes easily, wetness, too sandy.	Wetness, erodes easily.
DdA Darroch	Severe: seepage.	Severe: cutbanks cave.	Frost action	Wetness, soil blowing.	Wetness, soil blowing.	Wetness.
DgA Darroch	Slight	Severe: slow refill, cutbanks cave.	Frost action, cutbanks cave.	Wetness	Wetness, too sandy.	Wetness.
EsB Elston Variant	Severe: seepage.	Severe: cutbanks cave.	Cutbanks cave	Wetness, soil blowing.	Wetness, too sandy, soil blowing.	Favorable.
FeA Foresman	Moderate: seepage.	Severe: slow refill, cutbanks cave.	Deep to water	Soil blowing	Erodes easily, soil blowing.	Erodes easily.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
FoA----------------- Foresman	Moderate: seepage.	Severe: slow refill, cutbanks cave.	Deep to water	Favorable------	Erodes easily	Erodes easily.
FoB2--------------- Foresman	Moderate: seepage, slope.	Severe: slow refill, cutbanks cave.	Deep to water	Slope----------	Erodes easily	Erodes easily.
FrA---------------- Foresman	Moderate: seepage.	Severe: cutbanks cave.	Deep to water	Soil blowing---	Erodes easily, soil blowing.	Erodes easily.
FrB2--------------- Foresman	Moderate: seepage, slope.	Severe: cutbanks cave.	Deep to water	Slope, soil blowing.	Erodes easily, soil blowing.	Erodes easily.
FtA---------------- Foresman	Moderate: seepage.	Severe: slow refill, cutbanks cave.	Deep to water	Rooting depth	Erodes easily	Erodes easily, rooting depth.
FtB2--------------- Foresman	Moderate: seepage, slope.	Severe: slow refill, cutbanks cave.	Deep to water	Slope, rooting depth.	Erodes easily	Erodes easily, rooting depth.
FwA---------------- Foresman	Moderate: seepage.	Severe: slow refill, cutbanks cave.	Deep to water	Percs slowly---	Erodes easily	Erodes easily.
GbA:						
Gilboa-----------	Moderate: seepage.	Severe: slow refill.	Favorable------	Wetness--------	Erodes easily, wetness.	Wetness, erodes easily.
Odell------------	Moderate: seepage.	Severe: slow refill.	Frost action, percs slowly.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, rooting depth.
Gf----------------- Gilford	Severe: seepage.	Severe: cutbanks cave.	Ponding, frost action, cutbanks cave.	Ponding, soil blowing.	Ponding, too sandy, soil blowing.	Wetness.
GhB---------------- Glenhall	Severe: seepage.	Severe: cutbanks cave.	Frost action---	Wetness--------	Wetness--------	Favorable.
Gn, Gt------------- Granby	Severe: seepage.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty.
Ho----------------- Houghton	Severe: seepage.	Severe: slow refill.	Ponding, subsides, frost action.	Ponding, soil blowing.	Ponding, soil blowing.	Wetness.
Ir----------------- Iroquois	Slight---------	Severe: slow refill.	Ponding, percs slowly, frost action.	Ponding, soil blowing, percs slowly.	Ponding, soil blowing, percs slowly.	Wetness, percs slowly.
Ke----------------- Kentland	Severe: seepage.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty.
MeA:						
Martinsville-----	Moderate: seepage.	Severe: no water.	Deep to water	Soil blowing---	Erodes easily, soil blowing.	Erodes easily.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
MeA:						
Williamstown	Moderate: seepage.	Severe: no water.	Frost action	Wetness, rooting depth.	Erodes easily, wetness.	Erodes easily, rooting depth.
MeB2:						
Martinsville	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Erodes easily, soil blowing.	Erodes easily.
Williamstown	Moderate: seepage, slope.	Severe: no water.	Frost action, slope.	Slope, wetness, rooting depth.	Erodes easily, wetness.	Erodes easily, rooting depth.
Mh: Maumee	Severe: seepage.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty, rooting depth.
Mk: Maumee	Severe: seepage.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, fast intake.	Ponding, too sandy, soil blowing.	Wetness, rooting depth.
MnC2, MnE: Miami	Severe: slope.	Severe: no water.	Deep to water	Slope, rooting depth.	Slope, erodes easily.	Slope, erodes easily, rooting depth.
Mp: Montgomery	Slight	Severe: slow refill.	Ponding, percs slowly.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
MrB2: Montmorenci	Moderate: seepage, slope.	Moderate: deep to water, slow refill.	Frost action, slope.	Slope, wetness, soil blowing.	Erodes easily, wetness, soil blowing.	Erodes easily.
MuA: Morocco	Severe: seepage.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
NsA, NsB: Nesius	Severe: seepage.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty.	Wetness, too sandy, soil blowing.	Droughty.
Nw: Newton	Severe: seepage.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty, rooting depth.
OaB: Oakville	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing.	Droughty.
OaC: Oakville	Severe: seepage, slope.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Slope, too sandy, soil blowing.	Slope, droughty.
ObB: Oakville	Severe: seepage.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake.	Too sandy, soil blowing.	Droughty.
OcC2: Octagon	Severe: slope.	Severe: no water.	Deep to water	Slope	Slope	Slope.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
OkB2:						
Octagon----------	Moderate: seepage, slope.	Severe: no water.	Deep to water	Slope, soil blowing.	Soil blowing---	Favorable.
Ayr--------------	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Erodes easily, too sandy, soil blowing.	Erodes easily, droughty.
OnA--------------- Onarga	Severe: seepage.	Severe: cutbanks cave.	Favorable------	Wetness, soil blowing.	Wetness, soil blowing.	Favorable.
OnB2-------------- Onarga	Severe: seepage.	Severe: cutbanks cave.	Slope----------	Slope, wetness, soil blowing.	Wetness, soil blowing.	Favorable.
OpB2-------------- Onarga	Severe: seepage.	Severe: slow refill, cutbanks cave.	Deep to water	Slope, soil blowing.	Soil blowing---	Favorable.
OrB--------------- Ormas	Severe: seepage.	Severe: no water.	Deep to water	Droughty, fast intake.	Too sandy, soil blowing.	Droughty.
PaA, PaB---------- Papineau	Moderate: seepage.	Severe: slow refill.	Percs slowly, frost action.	Wetness, soil blowing, percs slowly.	Wetness, soil blowing, percs slowly.	Wetness, percs slowly.
Pp---------------- Peotone	Slight---------	Severe: slow refill.	Ponding, percs slowly, frost action.	Ponding, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
Pt. Pits						
Pu---------------- Prochaska	Severe: seepage.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty, rooting depth.
Px, Py------------ Prochaska	Severe: seepage.	Severe: cutbanks cave.	Ponding, flooding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty, rooting depth.
RtA--------------- Ridgeville	Severe: seepage.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness, soil blowing.	Wetness, too sandy, soil blowing.	Wetness.
RuA--------------- Ridgeville	Severe: seepage.	Severe: slow refill, cutbanks cave.	Favorable------	Wetness, soil blowing.	Wetness, soil blowing.	Wetness.
Rv---------------- Ross	Severe: seepage.	Moderate: deep to water, slow refill.	Deep to water	Flooding-------	Favorable------	Favorable.
Sd---------------- Sawabash	Moderate: seepage.	Moderate: slow refill.	Ponding, flooding, frost action.	Ponding, flooding.	Ponding--------	Wetness.
SeA--------------- Seafield	Severe: seepage.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness, soil blowing.	Wetness, too sandy, soil blowing.	Wetness.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Sf----------------- Selma	Severe: seepage.	Severe: cutbanks cave.	Ponding, frost action.	Ponding, soil blowing.	Ponding, soil blowing.	Wetness.
Sg, Sh------------ Selma	Severe: seepage.	Severe: cutbanks cave.	Ponding, frost action.	Ponding---------	Ponding---------	Wetness.
Sk----------------- Selma	Moderate: seepage.	Severe: slow refill, cutbanks cave.	Ponding, frost action.	Ponding, percs slowly.	Ponding---------	Wetness.
SmB--------------- Simonin	Severe: seepage.	Severe: slow refill, cutbanks cave.	Percs slowly---	Wetness, droughty.	Wetness, soil blowing.	Droughty, percs slowly.
SrB--------------- Sparta	Severe: seepage.	Severe: no water.	Deep to water	Droughty, fast intake.	Too sandy, soil blowing.	Droughty.
SwA--------------- Strole	Slight----------	Severe: slow refill.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
SxA: Sumava------------	Severe: seepage.	Moderate: slow refill.	Favorable------	Wetness, soil blowing.	Erodes easily, wetness, soil blowing.	Wetness, erodes easily.
Ridgeville--------	Severe: seepage.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness, soil blowing.	Wetness, too sandy, soil blowing.	Wetness.
Odell-------------	Moderate: seepage.	Moderate: slow refill.	Frost action---	Wetness---------	Wetness---------	Wetness.
SyA--------------- Swygert	Slight----------	Severe: no water.	Percs slowly, frost action.	Wetness---------	Erodes easily, wetness.	Wetness, erodes easily.
SzB2: Swygert Variant--	Moderate: slope.	Severe: slow refill.	Percs slowly, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, rooting depth.
Simonin-----------	Severe: seepage.	Severe: slow refill, cutbanks cave.	Percs slowly, slope.	Slope, wetness, droughty.	Wetness, soil blowing.	Droughty, percs slowly.
SzC2: Swygert Variant--	Severe: slope.	Severe: slow refill.	Percs slowly, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
Simonin-----------	Severe: seepage, slope.	Severe: slow refill, cutbanks cave.	Percs slowly, slope.	Slope, wetness, droughty.	Slope, wetness, soil blowing.	Slope, droughty, percs slowly.
TaA--------------- Tedrow	Severe: seepage.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty.	Wetness, too sandy, soil blowing.	Wetness, droughty.
To----------------- Toto	Severe: seepage.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly, subsides.	Ponding, soil blowing, percs slowly.	Ponding, too sandy, soil blowing.	Wetness, percs slowly.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Ud. Udorthents						
Wa----------------- Wallkill	Severe: seepage.	Moderate: slow refill.	Ponding, frost action.	Ponding, erodes easily.	Erodes easily, ponding.	Wetness, erodes easily.
Wc----------------- Wallkill Variant	Severe: seepage.	Severe: slow refill.	Ponding, subsides, frost action.	Ponding--------	Erodes easily, ponding.	Wetness, erodes easily.
WeA---------------- Watseka	Severe: seepage.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty.	Wetness, too sandy, soil blowing.	Wetness, droughty.
WkA---------------- Wesley	Severe: seepage.	Severe: no water.	Frost action---	Wetness--------	Erodes easily, wetness, soil blowing.	Wetness, erodes easily.
ZaA---------------- Zaborosky	Severe: seepage.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty.	Wetness, too sandy, soil blowing.	Wetness, droughty.
ZbB: Zaborosky---------	Severe: seepage.	Severe: cutbanks cave.	Slope, cutbanks cave.	Slope, wetness, droughty.	Wetness, too sandy, soil blowing.	Wetness, droughty.
Oakville----------	Severe: seepage.	Severe: cutbanks cave.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing.	Droughty.
Zg: Zadog------------	Severe: seepage.	Severe: cutbanks cave.	Ponding, frost action, cutbanks cave.	Ponding--------	Ponding, too sandy, soil blowing.	Wetness.
Granby-----------	Severe: seepage.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty.

TABLE 16.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Ac:											
Ackerman--------	0-8	Sapric material	PT	A-8	0	---	---	---	---	---	---
	8-14	Coprogenous earth	OH, OL	A-8	0	---	---	---	---	---	---
	14-60	Sand-------------	SM, SP-SM	A-2-4, A-3	0	100	100	70-90	0-15	---	NP
Martisco Variant	0-10	Mucky loam-------	ML, CL-ML	A-4, A-6	0	100	100	85-100	55-70	20-40	5-25
	10-21	Marl-------------	OL	A-8	0	---	---	---	---	---	---
	21-30	Coprogenous earth	OH, OL	A-8	0	---	---	---	---	---	---
	30-60	Sand-------------	SM, SP-SM	A-2-4, A-3	0	100	100	70-90	0-15	---	NP
Ad--------------- Adrian	0-30	Sapric material	PT	A-8	---	---	---	---	---	---	---
	30-60	Sand-------------	SP-SM, SM	A-2-4, A-3	0	100	100	70-90	0-15	---	NP
Af--------------- Adrian Variant	0-11	Sapric material	PT	A-8	0	---	---	---	---	---	---
	11-60	Sand-------------	SM, SP-SM	A-2-4, A-3	0	100	100	70-90	0-15	---	NP
Ap--------------- Algansee	0-9	Loamy sand-------	SM, SP-SM	A-2-4	0	100	100	75-90	15-30	---	NP
	9-60	Stratified loamy sand to sandy loam.	SM, SP-SM	A-3, A-4, A-2-4	0	100	100	75-100	15-45	0-30	NP-10
Ar--------------- Aquolls	0-60	Variable---------	---	---	---	---	---	---	---	---	---
AuA:											
Aubbeenaubbee---	0-9	Fine sandy loam	SM, SC-SM, SC	A-4	0	95-100	90-100	80-90	20-45	<25	NP-10
	9-26	Fine sandy loam	SM, SC, SC-SM, CL-ML	A-2-4, A-4	0	95-100	90-100	80-95	25-60	10-30	NP-10
	26-43	Clay loam--------	CL	A-6, A-7-6	0-1	95-100	90-100	85-95	55-80	30-50	10-30
	43-60	Loam, fine sandy loam.	CL, CL-ML, ML, SC	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
Whitaker--------	0-16	Fine sandy loam	SM, SC-SM, SC, ML	A-4	0	95-100	90-100	80-90	40-60	<25	NP-10
	16-49	Clay loam, sandy clay loam.	CL, SC, SM-SC	A-6, A-2, A-4, A-7-6	0	95-100	90-100	80-95	40-90	20-60	5-30
	49-60	Stratified loamy sand to silt loam.	ML, SM, CL-ML, CL, SP-SM	A-4, A-2-4, A-6	0	98-100	95-100	75-100	15-100	<40	NP-15
AyB-------------- Ayr	0-10	Loamy fine sand	SM	A-2	0	100	95-100	90-100	20-35	---	NP
	10-35	Loamy sand, loamy fine sand.	SM, SP-SM	A-2-4, A-3	0	100	95-100	70-100	10-35	---	NP
	35-40	Loam-------------	CL, CL-ML	A-4, A-6	0-1	90-100	85-100	85-95	55-70	20-40	5-25
	40-60	Loam-------------	CL, CL-ML, ML, SC	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
AzA-------------- Ayrmount	0-8	Loamy fine sand	SM, SP-SM	A-2-4, A-3	0	100	100	90-100	20-35	---	NP
	8-30	Fine sand, loamy fine sand, loamy sand.	SM, SP-SM	A-2-4, A-3	0	100	95-100	55-100	0-35	---	NP
	30-33	Sandy clay loam	SM, CL	A-6, A-4	0	95-100	90-100	80-95	40-55	20-40	5-20
	33-44	Loam-------------	CL, CL-ML	A-4, A-6	0-3	95-100	90-100	85-95	55-70	20-40	5-25
	44-60	Loam, fine sandy loam.	ML, CL-ML, CL, SC	A-4, A-6	0-3	95-100	85-98	65-90	40-70	15-30	NP-15
BbA:											
Barce-----------	0-11	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0-1	95-100	90-100	80-100	60-90	25-40	4-15
	11-40	Loam, clay loam	CL, SC, CL-ML	A-6, A-4, A-7-6	0-1	90-100	85-100	70-95	40-75	20-50	5-30
	40-48	Loam-------------	CL, CL-ML	A-4, A-6	0-3	90-100	85-100	75-95	55-70	20-40	5-25
	48-60	Loam, fine sandy loam.	CL, CL-ML, ML, SC	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
Corwin----------	0-11	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0-1	95-100	90-100	80-100	60-90	25-40	4-15
	11-32	Clay loam, silty clay loam.	CL, ML	A-6, A-7-6	0-1	90-100	90-100	85-100	55-90	30-50	10-35
	32-60	Loam, fine sandy loam.	CL, ML, CL-ML, SC	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
BfB2:											
Barce-----------	0-10	Loam-------------	ML, CL-ML	A-4, A-6	0-1	95-100	90-100	85-95	55-70	20-40	5-20
	10-42	Clay loam, sandy clay loam.	CL, SC, SM-SC	A-6, A-4, A-7-6	0-1	90-100	85-100	60-95	40-75	20-60	5-30
	42-48	Loam-------------	CL, CL-ML	A-4, A-6	0-3	90-100	85-100	75-95	55-70	20-40	5-25
	48-60	Loam, fine sandy loam.	CL, CL-ML, ML, SC	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
Montmorenci-----	0-8	Loam-------------	CL, CL-ML, ML	A-4, A-6	0-1	95-100	90-100	85-100	60-85	15-40	NP-15
	8-25	Clay loam--------	CL	A-6, A-7-6	0-1	95-100	90-100	85-95	55-80	30-50	10-30
	25-32	Clay loam--------	CL	A-6, A-7-6	0-1	95-100	90-100	85-100	55-80	30-50	10-30
	32-37	Loam-------------	CL, CL-ML	A-4, A-6	0-3	90-100	85-100	75-95	55-70	20-40	5-25
	37-60	Loam, fine sandy loam.	CL, CL-ML, ML, SC	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
Bh:											
Barry-----------	0-12	Fine sandy loam	SM, SC-SM, SC, CL-ML	A-4	0-1	95-100	90-100	85-95	45-55	<25	NP-10
	12-47	Loam-------------	CL, CL-ML	A-6, A-4	0-1	95-100	90-100	85-95	55-70	20-40	5-25
	47-60	Fine sandy loam, loam.	SC, ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
Gilford---------	0-18	Fine sandy loam	SM, SC, SC-SM, ML	A-4	0	95-100	90-100	80-90	40-60	<25	NP-10
	18-30	Fine sandy loam	SM, SC, SC-SM, ML	A-2-4, A-4	0	95-100	90-100	80-95	25-60	10-30	NP-10
	30-38	Loamy sand, sand	SM, SP-SM	A-3, A-2-4	0	95-100	90-100	55-85	0-30	---	NP
	38-60	Sand, loamy sand	SP-SM, SM	A-2-4, A-3	0	95-100	90-100	55-85	0-30	---	NP

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
BmB---------------- Brems	0-7	Loamy sand-------	SM, SP-SM	A-2-4	0	100	95-100	60-90	10-25	---	NP
	7-36	Sand, loamy fine sand, loamy sand.	SM, SP-SM	A-3, A-2-4	0	100	95-100	60-95	0-25	---	NP
	36-60	Sand-------------	SP-SM, SM	A-3, A-2-4	0	100	95-100	60-90	0-15	---	NP
By---------------- Bryce	0-16	Silty clay loam	CL, ML	A-7-6, A-6	0	100	100	95-100	80-100	35-55	10-30
	16-53	Silty clay-------	CH, CL	A-7-6	0-3	98-100	95-100	90-100	80-100	40-65	20-40
	53-60	Silty clay-------	CH, CL	A-7-6	0-3	98-100	90-100	85-95	75-85	40-55	15-30
Co---------------- Comfrey	0-17	Loam-------------	CL-ML, CL	A-6, A-4	0	95-100	90-100	75-100	50-80	20-40	5-25
	17-31	Loam-------------	CL, CL-ML	A-4, A-6	0	95-100	90-100	75-100	50-80	20-40	5-25
	31-60	Loam-------------	CL, CL-ML	A-4, A-6	0	90-100	85-100	70-100	50-80	20-40	5-25
Cr---------------- Conrad	0-8	Loamy fine sand	SM, SP-SM	A-2-4, A-3	0	100	100	85-100	15-35	---	NP
	8-25	Fine sand--------	SM, SP-SM, SP	A-2-4, A-3	0	100	100	85-95	0-15	---	NP
	25-60	Fine sand, sand	SM, SP-SM, SP	A-2-4, A-3	0	100	100	70-95	0-15	---	NP
CtA, CtB2-------- Corwin	0-12	Fine sandy loam	SM, CL-ML, CL	A-4	0-1	95-100	90-100	85-90	45-55	15-30	NP-10
	12-35	Clay loam--------	CL	A-6, A-7-6	0-1	95-100	90-100	85-95	55-80	30-50	10-30
	35-40	Loam-------------	CL, CL-ML	A-6, A-4	0-3	95-100	90-100	85-95	55-70	20-40	5-25
	40-60	Loam-------------	CL, CL-ML, ML, SC	A-4, A-6	0-3	90-100	85-98	75-90	40-70	15-30	NP-15
Cv---------------- Craigmile	0-14	Sandy loam-------	SM, SC-SM, SC	A-4, A-2-4	0	100	95-100	85-100	25-45	<25	NP-10
	14-35	Sandy loam-------	SC-SM, SM, SC	A-4, A-2-4	0	100	95-100	85-100	25-45	<25	NP-10
	35-60	Sand-------------	SM, SP-SM	A-3, A-2-4	0	95-100	90-100	60-90	0-15	---	NP
Cz---------------- Craigmile	0-10	Mucky silt loam	CL-ML, CL, ML	A-4, A-6	0	100	100	95-100	75-100	25-40	5-15
	10-23	Fine sandy loam, loam.	CL, CL-ML, SM, SC-SM	A-4, A-6, A-2-4	0	100	95-100	85-100	30-80	<40	NP-25
	23-60	Loamy fine sand, sand, fine sand.	SM, SP-SM	A-3, A-2-4	0	95-100	90-100	55-90	0-30	---	NP
DaA--------------- Darroch	0-13	Fine sandy loam	SC-SM, SC, SM, ML	A-4	0	100	95-100	80-95	40-70	<25	NP-10
	13-36	Clay loam, loam	CL, CL-ML, SC-SM	A-4, A-6, A-7-6	0	95-100	90-100	75-100	40-80	20-60	5-30
	36-60	Stratified loamy sand to silt loam.	CL-ML, CL, SM, SP-SM	A-4, A-3, A-6, A-2-4	0	98-100	95-100	75-100	15-100	<40	NP-15
DcA--------------- Darroch	0-12	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	95-100	85-100	70-90	25-40	4-15
	12-16	Silt loam, silty clay loam.	CL, ML, CL-ML, CH	A-6, A-4, A-7-6	0	100	95-100	85-100	70-90	25-65	4-40
	16-32	Clay loam, loam	CL, CL-ML, SC-SM	A-4, A-6, A-7-6	0	95-100	90-100	75-100	50-80	20-60	5-30
	32-60	Stratified fine sand to silt loam.	CL, ML, CL-ML, SM, SP-SM	A-4, A-3, A-6, A-7-6	0	98-100	95-100	55-100	0-100	<40	NP-15

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
DdA--------------- Darroch	0-10	Fine sandy loam	SM, SC-SM, SC, ML	A-4	0	100	95-100	80-95	40-70	<25	NP-10
	10-35	Clay loam, sandy clay loam.	CL, SC, SC-SM	A-4, A-6, A-7-6	0	95-100	90-100	80-95	40-90	20-60	5-30
	35-60	Sand, loamy sand	SM, SP-SM	A-2-4, A-3	0-3	95-100	90-100	55-85	0-25	---	NP
DgA--------------- Darroch	0-10	Loam-------------	ML, CL-ML	A-4, A-6	0	100	95-100	80-100	50-70	20-40	5-20
	10-22	Clay loam--------	CL	A-4, A-6, A-7-6	0	100	95-100	85-95	60-90	20-60	5-30
	22-55	Stratified loamy sand to silt loam.	SM, CL, CL-ML, SP-SM	A-2-4, A-6, A-4	0	100	95-100	75-100	15-100	<40	NP-15
	55-60	Loam-------------	CL, CL-ML, ML, SC	A-4, A-6	0-3	90-100	85-98	75-90	40-70	15-30	NP-15
EsB--------------- Elston Variant	0-10	Fine sandy loam	SM, SC-SM, SC, ML	A-4	0	95-100	90-100	80-95	40-70	<25	NP-10
	10-27	Fine sandy loam	SM, SC-SM, SC	A-4, A-2-4	0	95-100	90-100	80-95	25-50	10-30	NP-10
	27-41	Loamy sand-------	SM, SC-SM, SP-SM	A-2-4, A-1	0-3	85-100	75-100	55-85	10-25	---	NP
	41-60	Sand-------------	SM, SP-SM	A-2-4, A-3	0-3	85-100	75-100	35-80	0-15	---	NP
FeA--------------- Foresman	0-12	Fine sandy loam	SC-SM, SM, SC, ML	A-4	0	100	95-100	80-95	40-70	<25	NP-10
	12-39	Clay loam--------	CL	A-4, A-6, A-7-6	0	95-100	90-100	80-95	55-75	20-60	5-30
	39-60	Stratified loamy sand to silt loam.	SM, SP-SM, CL, CL-ML	A-4, A-6, A-2-4	0	98-100	95-100	75-100	15-100	<40	NP-15
FoA, FoB2--------- Foresman	0-10	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	95-100	85-100	70-90	25-40	4-15
	10-34	Clay loam--------	CL	A-4, A-6, A-7-6	0	95-100	90-100	80-95	55-75	20-60	5-30
	34-60	Stratified loamy sand to silt loam.	SM, SP-SM, CL, CL-ML	A-4, A-6, A-3, A-2-4	0	98-100	95-100	75-100	15-100	<40	NP-15
FrA, FrB2--------- Foresman	0-10	Fine sandy loam	SC, SM, ML, SC-SM	A-4	0	95-100	90-100	80-95	40-70	<25	NP-10
	10-33	Clay loam, loam	CL, CL-ML	A-6, A-4, A-7-6	0	95-100	90-100	75-100	50-80	20-60	5-30
	33-48	Stratified loamy sand to silt loam.	CL-ML, CL, SP-SM, SM	A-4, A-6, A-2-4, A-3	0	98-100	95-100	75-100	15-100	<40	NP-15
	48-60	Loam, fine sandy loam.	CL-ML, ML, CL, SC	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
FtA, FtB2--------- Foresman	0-11	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	95-100	85-100	70-90	25-40	4-15
	11-36	Loam, clay loam	CL, CL-ML	A-4, A-6, A-7-6	0	95-100	90-100	75-100	50-80	20-60	5-30
	36-54	Stratified loamy sand to silt loam.	CL-ML, CL, SM, SP-SM	A-4, A-6, A-2-4, A-3	0	98-100	95-100	75-100	15-100	<40	NP-15
	54-60	Loam, fine sandy loam.	CL, CL-ML, ML, SC	A-4, A-6	0-3	90-100	85-98	75-90	40-70	15-30	NP-15

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
FwA-------------- Foresman	0-14	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	95-100	85-100	70-90	25-40	4-15
	14-29	Loam, clay loam	CL, CL-ML	A-4, A-6, A-7-6	0	95-100	90-100	75-100	50-80	20-60	5-30
	29-45	Stratified loamy sand to silt loam.	SM, SP-SM, CL, CL-ML	A-2-4, A-6, A-4, A-3	0	98-100	95-100	75-100	15-100	<40	NP-15
	45-60	Silty clay loam	CL	A-6, A-7-6	0-3	98-100	95-100	85-95	70-85	25-45	10-25
GbA:											
Gilboa-----------	0-10	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	98-100	90-100	70-90	25-40	4-15
	10-18	Silty clay loam	CL, ML, CH	A-6, A-7-6	0-1	100	98-100	90-100	80-90	35-55	15-35
	18-41	Clay loam--------	CL	A-6, A-4, A-7-6	0-1	90-100	75-95	55-90	50-65	20-60	5-30
	41-50	Loam-------------	CL-ML, CL	A-4, A-6	0-3	90-100	85-100	75-95	55-70	20-40	5-25
	50-60	Loam, fine sandy loam.	CL-ML, CL, ML, SC	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
Odell------------	0-13	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	98-100	90-100	70-90	25-40	4-15
	13-29	Clay loam--------	CL	A-4, A-6	0-1	95-100	90-100	85-95	55-80	20-40	5-25
	29-35	Loam-------------	CL, CL-ML	A-4, A-6	0-3	90-100	85-100	75-95	55-70	20-40	5-25
	35-60	Loam, fine sandy loam.	ML, CL-ML, CL, SC	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
Gf--------------- Gilford	0-15	Fine sandy loam	SM, SC, ML, SC-SM	A-4	0	100	100	85-95	45-70	<25	NP-10
	15-34	Fine sandy loam	SM, SC, SC-SM	A-2-4, A-4	0	100	100	85-95	25-50	10-30	NP-10
	34-60	Fine sand--------	SP, SP-SM, SM	A-2-4, A-3	0	100	100	85-95	0-15	---	NP
GhB-------------- Glenhall	0-9	Loam-------------	ML, CL-ML	A-4, A-6	0	100	95-100	80-100	55-70	20-40	5-20
	9-30	Clay loam--------	CL	A-4, A-6, A-7-6	0	90-100	85-100	65-95	55-75	20-60	5-30
	30-37	Loam-------------	CL, SC, CL-ML	A-6, A-4	0	85-100	75-98	60-90	40-60	20-40	5-20
	37-49	Gravelly sandy loam.	SC, SC-SM, SM	A-2-4	0	60-90	50-75	30-55	15-25	10-30	NP-10
	49-60	Stratified sand to loam.	SM, SP-SM, CL, CL-ML	A-3, A-4, A-6, A-2-4	0	85-100	75-98	40-90	0-60	<40	NP-25
Gn--------------- Granby	0-10	Mucky loamy fine sand.	SM, SP-SM	A-2-4, A-3	0	100	100	85-100	15-35	---	NP
	10-24	Sand-------------	SP-SM, SM	A-3, A-2-4	0	100	95-100	55-80	0-15	---	NP
	24-60	Sand-------------	SM, SP-SM	A-3, A-2-4	0	100	95-100	55-80	0-15	---	NP
Gt--------------- Granby	0-14	Loamy fine sand	SM, SP-SM	A-2-4, A-3	0	100	100	85-100	15-35	---	NP
	14-37	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	95-100	55-85	0-15	---	NP
	37-60	Sand-------------	SM, SP-SM	A-3, A-2-4	0	100	95-100	55-80	0-15	---	NP
Ho--------------- Houghton	0-60	Sapric material	PT	A-8	0	---	---	---	---	---	---

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Ir---------------- Iroquois	0-11	Fine sandy loam	SC, SM, SC-SM, ML	A-4	0	100	95-100	80-95	40-70	<25	NP-10
	11-32	Sandy clay loam	CL, SC	A-4, A-6	0	100	95-100	80-95	40-55	20-60	5-20
	32-36	Clay loam--------	CL, SC	A-6, A-4, A-7-6	0	100	95-100	80-95	45-75	20-60	5-30
	36-60	Silty clay-------	CL, CH	A-7-6	0	100	100	95-100	85-100	40-55	15-30
Ke---------------- Kentland	0-12	Mucky fine sand	SM, SP, SP-SM	A-2-4, A-3	0	100	100	85-95	0-15	---	NP
	12-16	Sapric material	PT	A-8	0	---	---	---	---	---	---
	16-60	Fine sand--------	SM, SP, SP-SM	A-2-4, A-3	0	100	100	85-95	0-15	---	NP
MeA: Martinsville----	0-9	Fine sandy loam	SM, SC-SM, SC	A-4	0	95-100	90-100	85-90	40-50	<25	NP-10
	9-31	Clay loam--------	CL	A-4, A-6, A-7-6	0	95-100	90-100	80-95	55-75	20-60	5-30
	31-46	Sandy loam, loam	SC-SM, CL-ML, CL, SC	A-4, A-6, A-2-4	0	95-100	90-100	75-100	25-70	10-40	NP-20
	46-60	Stratified loamy sand to silt loam.	SM, SP-SM, CL-ML, SC	A-4, A-6, A-7-6, A-3	0	98-100	95-100	75-100	15-100	<40	NP-15
Williamstown----	0-8	Loam-------------	CL, ML, CL-ML	A-4, A-6	0-1	95-100	90-100	85-100	60-85	15-40	NP-15
	8-30	Clay loam--------	CL	A-6, A-4	0-1	95-100	90-100	85-95	55-80	20-40	5-25
	30-35	Loam-------------	CL, CL-ML	A-6, A-4	0-1	90-100	85-100	75-95	55-70	20-40	5-25
	35-60	Loam, fine sandy loam.	ML, CL-ML, CL, SC	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
MeB2: Martinsville----	0-9	Fine sandy loam	SM, SC-SM, SC, ML	A-4	0	95-100	90-100	85-90	45-55	<25	NP-10
	9-31	Clay loam--------	CL	A-7-6, A-4, A-6	0	95-100	90-100	80-95	55-75	20-60	5-30
	31-46	Sandy loam, loam	SC-SM, SC, CL-ML, CL	A-2-4, A-4, A-6	0	95-100	90-100	75-100	25-70	10-40	NP-20
	46-60	Stratified loamy sand to silt loam.	SM, SP-SM, SC, CL-ML	A-3, A-4, A-6, A-7-6	0	98-100	95-100	75-100	15-100	<40	NP-15
Williamstown----	0-8	Loam-------------	CL, ML, CL-ML	A-4, A-6	0-1	95-100	90-100	85-100	60-85	15-40	NP-15
	8-30	Clay loam--------	CL	A-6, A-4	0-1	95-100	90-100	85-95	55-80	20-40	5-25
	30-35	Loam-------------	CL, CL-ML	A-6, A-4	0-1	90-100	85-100	75-95	55-70	20-40	5-25
	35-60	Loam, fine sandy loam.	ML, CL-ML, CL, SC	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
Mh---------------- Maumee	0-18	Loamy fine sand	SM, SP-SM	A-2-4, A-3	0	100	95-100	85-95	15-25	---	NP
	18-60	Sand-------------	SM, SP-SM	A-3, A-2-4	0	90-100	85-100	55-90	0-15	---	NP
Mk---------------- Maumee	0-18	Mucky loamy fine sand.	SM, SP-SM	A-2-4	0	100	95-100	85-95	15-25	---	NP
	18-60	Sand-------------	SM, SP-SM	A-3, A-2-4	0	90-100	85-100	55-90	0-15	---	NP

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
MnC2, MnE-------- Miami	0-8	Loam-------------	CL, CL-ML, ML	A-4, A-6	0-1	95-100	90-100	85-100	60-85	15-40	NP-15
	8-29	Clay loam--------	CL	A-4, A-6	0-1	95-100	90-100	85-95	55-80	20-40	5-25
	29-33	Loam-------------	CL, CL-ML	A-4, A-6	0-3	90-100	85-100	75-95	55-70	20-40	5-25
	33-60	Loam, fine sandy loam.	CL, CL-ML, SC, ML	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
Mp--------------- Montgomery	0-14	Silty clay loam	CL, ML, CH	A-6, A-7-6	0	100	100	95-100	80-100	35-55	10-30
	14-44	Silty clay loam, silty clay.	CH, CL, ML	A-7-6	0	100	100	95-100	80-100	40-65	15-40
	44-60	Stratified silty clay to silty clay loam.	CL, CH	A-6, A-7-6	0	100	100	95-100	80-100	30-55	10-30
MrB2------------- Montmorenci	0-9	Fine sandy loam	CL-ML, CL, SM	A-4	0-1	95-100	90-100	85-90	45-55	15-30	NP-10
	9-33	Clay loam--------	CL	A-4, A-6	0-1	95-100	90-100	85-95	55-80	20-40	5-25
	33-60	Loam, fine sandy loam.	CL, CL-ML, ML, SC	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-40	NP-15
MuA-------------- Morocco	0-9	Loamy sand-------	SM, SP-SM	A-2-4	0	100	95-100	60-90	10-25	---	NP-5
	9-60	Fine sand--------	SM, SP-SM	A-3, A-2-4	0	100	95-100	80-95	0-15	---	NP
NsA, NsB--------- Nesius	0-15	Loamy fine sand	SM, SP-SM	A-3, A-2-4	0	100	95-100	85-95	15-25	---	NP
	15-53	Fine sand--------	SM, SP-SM, SP	A-3, A-2-4	0	100	95-100	80-95	0-15	---	NP
	53-60	Fine sand, sand	SM, SP, SP-SM	A-3, A-2-4	0	100	95-100	80-95	0-15	---	NP
Nw--------------- Newton	0-5	Loamy fine sand	SM, SP-SM	A-3, A-2-4	0	100	95-100	85-95	15-25	---	NP-5
	5-60	Fine sand--------	SP-SM, SM, SP	A-3, A-2-4	0	100	95-100	80-95	0-15	---	NP
OaB, OaC--------- Oakville	0-6	Fine sand--------	SM, SP-SM, SP	A-3, A-2-4	0	100	100	85-95	0-15	---	NP
	6-36	Fine sand--------	SM, SP-SM, SP	A-3, A-2-4	0	100	100	85-95	0-15	---	NP
	36-60	Sand, fine sand	SP-SM, SM, SP	A-3, A-2-4	0	100	100	70-95	0-15	---	---
ObB-------------- Oakville	0-8	Fine sand--------	SM, SP-SM, SP	A-3, A-2-4	0	100	100	85-95	0-15	---	NP
	8-34	Fine sand--------	SM, SP-SM, SP	A-3, A-2-4	0	100	100	85-95	0-15	---	NP
	34-60	Sand, fine sand	SP-SM, SM, SP	A-3, A-2-4	0	100	100	70-95	0-15	---	NP
OcC2------------- Octagon	0-7	Loam-------------	CL, CL-ML, ML	A-4, A-6	0-1	95-100	90-100	85-100	60-85	15-40	NP-15
	7-25	Clay loam--------	CL	A-4, A-6	0-1	95-100	90-100	85-95	55-80	20-40	5-25
	25-60	Loam, fine sandy loam.	CL, CL-ML, ML, SC	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
OkB2:											
Octagon----------	0-9	Fine sandy loam	SM, CL-ML, CL	A-4	0-1	95-100	90-100	85-90	45-55	15-30	NP-10
	9-31	Clay loam, loam	CL, CL-ML	A-4, A-6, A-7-6	0-1	95-100	90-100	85-95	55-80	20-50	5-30
	31-60	Loam, fine sandy loam.	CL, CL-ML, ML, SC	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
Ayr--------------	0-8	Loamy fine sand	SM, SP-SM	A-3, A-2-4	0	100	100	90-100	20-35	---	NP
	8-34	Fine sand, loamy fine sand.	SM, SP-SM	A-3, A-2-4	0	100	95-100	70-100	10-35	---	NP
	34-37	Loam-------------	CL, CL-ML	A-4, A-6	0-3	90-100	85-100	85-95	55-70	20-40	5-25
	37-60	Loam, fine sandy loam.	CL, CL-ML, ML, SC	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
OnA, OnB2--------- Onarga	0-10	Fine sandy loam	SC-SM, SM, SC, ML	A-4	0	95-100	90-100	80-95	40-70	<25	NP-10
	10-50	Sandy loam, fine sandy loam.	SC-SM, SM, SC	A-2-4, A-4	0	95-100	90-100	75-95	25-50	10-30	NP-10
	50-60	Stratified sand to fine sandy loam.	SP-SM, SM, SC-SM, SC	A-3, A-4, A-2-4	0	95-100	90-100	60-95	0-50	<25	NP-10
OpB2------------- Onarga	0-9	Fine sandy loam	SC-SM, SC, SM, ML	A-4	0	95-100	90-100	80-95	40-70	10-30	NP-10
	9-38	Fine sandy loam, sandy loam.	SC-SM, SM, SC	A-2-4, A-4	0	95-100	90-100	75-95	25-50	10-30	NP-10
	38-44	Stratified sand to fine sandy loam.	SM, SC, SP-SM, SC-SM	A-2-4, A-4, A-3	0	95-100	90-100	60-95	0-50	<25	NP-10
	44-60	Loam, fine sandy loam.	CL, CL-ML, ML, SC	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
OrB-------------- Ormas	0-10	Loamy sand-------	SM, SP-SM	A-2-4	0	98-100	95-100	60-90	10-25	---	NP
	10-24	Loamy sand-------	SM, SP-SM	A-2-4	0	95-100	95-100	60-90	10-25	---	NP
	24-45	Gravelly sandy loam.	SC-SM, SM, SC	A-2-4	0	70-85	50-75	40-55	15-25	10-30	NP-10
	45-60	Coarse sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	85-100	75-100	35-85	0-25	---	NP
PaA, PaB--------- Papineau	0-10	Fine sandy loam	SC-SM, SC, ML	A-4	0	100	95-100	80-95	40-70	<25	5-10
	10-37	Clay loam--------	SC, SM, SC-SM, ML	A-4, A-6	0	100	95-100	80-95	45-70	20-40	8-25
	37-60	Silty clay-------	CH	A-7	0	100	100	95-100	85-100	50-65	30-45
Pp--------------- Peotone	0-11	Silty clay loam	CH, CL, ML	A-7-6	0	100	100	95-100	80-100	35-55	10-30
	11-46	Silty clay loam	CH, ML, CL	A-7-6	0	100	100	95-100	80-100	40-60	15-35
	46-60	Silty clay loam	CL	A-6, A-7-6	0	100	100	95-100	80-100	30-50	10-25
Pt. Pits											
Pu, Px, Py------- Prochaska	0-19	Loamy sand-------	SM, SP-SM	A-2-4	0	100	95-100	60-90	10-30	---	NP
	19-33	Loamy sand-------	SP-SM, SM	A-3, A-2-4	0	95-100	90-100	55-90	5-30	---	NP
	33-60	Sand-------------	SM, SP-SM	A-3, A-2-4	0	95-100	90-100	60-90	0-15	---	NP

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
RtA--------------- Ridgeville	0-10	Fine sandy loam	SC, SC-SM, ML	A-4	0	95-100	90-100	80-95	40-70	<25	NP-10
	10-40	Fine sandy loam	SC-SM, SC, ML	A-4	0	95-100	90-100	80-95	40-70	10-30	NP-10
	40-60	Fine sandy loam, fine sand.	SM, SC-SM, SC, SP	A-2, A-4	0	95-100	90-100	55-95	0-50	<25	NP-10
RuA--------------- Ridgeville	0-13	Fine sandy loam	SC-SM, SC, ML	A-4	0	95-100	90-100	80-95	40-70	10-30	NP-10
	13-46	Fine sandy loam, sandy loam.	SC-SM, SC, SM	A-2-4, A-4	0	95-100	90-100	75-95	25-50	10-30	NP-10
	46-54	Stratified loamy sand to sandy loam.	SP-SM, SM	A-2-4, A-4, A-3	0	95-100	90-100	60-85	10-40	<30	NP-10
	54-60	Loam, fine sandy loam.	CL, CL-ML, ML, SC	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
Rv---------------- Ross	0-30	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	95-100	90-100	85-100	65-100	25-40	5-15
	30-39	Loam, silt loam, silty clay loam.	ML, CL, CL-ML	A-6, A-4, A-7	0	95-100	90-100	80-100	50-100	20-50	5-25
	39-60	Stratified loam to very fine sandy loam.	CL, CL-ML, SC, SM-SC	A-6, A-4, A-2-4	0-5	95-100	90-100	75-100	20-80	<40	NP-25
Sd---------------- Sawabash	0-6	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	80-100	35-50	10-25
	6-35	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	80-100	35-50	10-25
	35-46	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	80-100	35-50	10-25
	46-60	Silt loam--------	CL, ML, CL-ML	A-6, A-4	0	100	100	95-100	75-100	25-40	5-15
SeA--------------- Seafield	0-8	Fine sandy loam	SM, SM-SC, SC, ML	A-4	0	95-100	90-100	80-90	40-60	10-30	NP-10
	8-31	Fine sandy loam, sandy clay loam.	SC-SM, SC, SM, CL	A-4, A-6	0	95-100	90-100	80-95	40-50	10-60	NP-20
	31-60	Fine sand--------	SM, SP-SM, SP	A-3, A-2-4	0	100	95-100	80-95	0-15	---	NP
Sf---------------- Selma	0-14	Fine sandy loam	SC-SM, SM, ML	A-4	0	100	95-100	80-90	40-70	<25	NP-10
	14-38	Loam-------------	CL, CL-ML	A-6, A-4	0	100	95-100	80-100	40-70	<25	5-20
	38-60	Stratified silt loam to very fine sand.	CL-ML, SM, SP-SM	A-4, A-6, A-3, A-2-4	0	95-100	90-100	55-100	0-100	<25	NP-15
Sg---------------- Selma	0-15	Silt loam--------	CL	A-4, A-6	0	100	95-100	90-100	70-85	25-35	7-17
	15-45	Loam, clay loam	CL, SC	A-6	0	95-100	90-100	75-100	45-80	24-36	11-19
	45-60	Stratified loamy sand to silt loam.	SP-SM, SM, CL-ML, CL	A-4, A-6, A-2-4	0	98-100	95-100	75-100	15-100	<40	NP-15
Sh---------------- Selma	0-17	Loam-------------	CL-ML, ML	A-6, A-4	0	100	100	85-100	55-70	20-40	5-20
	17-27	Clay loam--------	CL	A-6, A-4, A-7-6	0	100	95-100	90-95	70-90	20-60	5-30
	27-42	Loam-------------	CL, CL-ML	A-4, A-6	0	95-100	90-100	80-95	55-75	20-40	5-20
	42-50	Loamy coarse sand	SM, SP-SM	A-2-4	0-3	90-100	85-100	40-60	5-15	---	NP
	50-60	Stratified sand to fine sandy loam.	SM, SP-SM	A-3, A-4	0-3	95-100	90-100	60-95	0-50	<25	NP-10

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
Sk---------------- Selma	0-16	Silty clay loam	CL, ML, CH	A-6, A-7-6	0	100	100	90-100	80-100	35-55	10-30
	16-48	Clay loam--------	CL	A-4, A-6	0	100	95-100	90-95	70-90	20-60	5-30
	48-55	Stratified loamy sand to sandy loam.	SM, SC-SM, SC, SP-SM	A-4	0	95-100	90-100	60-85	10-40	<25	NP-10
	55-60	Loam, fine sandy loam.	CL, CL-ML, ML, SC	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
SmB--------------- Simonin	0-10	Loamy sand-------	SP-SM, SM	A-2-4	0	100	95-100	60-85	10-25	---	NP
	10-28	Sand-------------	SP-SM, SM	A-2-4, A-3	0	100	95-100	60-80	0-15	---	NP
	28-34	Sandy loam-------	SM, SC-SM, SC	A-2-4, A-4	0	100	95-100	80-95	25-50	10-30	NP-10
	34-39	Silty clay-------	CH, CL	A-7-6	0	100	100	95-100	85-100	45-65	20-40
	39-60	Silty clay-------	CH, CL	A-7-6	0	100	100	95-100	85-100	40-55	15-30
SrB--------------- Sparta	0-9	Loamy fine sand	SM, SP-SM	A-3, A-2-4	0	100	100	90-100	20-35	---	NP
	9-31	Fine sand--------	SP-SM, SM, SP	A-3, A-4, A-2-4	0	100	100	85-95	0-15	---	NP
	31-60	Fine sand--------	SP-SM, SM, SP	A-3, A-2-4	0	100	100	85-95	0-15	---	NP
SwA--------------- Strole	0-12	Silty clay loam	CL, ML, CH	A-6, A-7-6	0	100	100	95-100	80-100	35-55	10-30
	12-30	Silty clay-------	CL, CH	A-7-6	0	100	100	95-100	85-100	45-65	20-40
	30-60	Silty clay-------	CL, CH	A-7-6	0	100	100	95-100	85-100	40-55	15-30
SxA:											
Sumava-----------	0-10	Fine sandy loam	SM, SC-SM, SC, CL-ML	A-4	0	100	100	85-95	45-70	<25	NP-10
	10-29	Fine sandy loam	SM, SC-SM, SC	A-4, A-2-4	0	100	100	85-95	25-50	10-30	NP-10
	29-36	Fine sandy loam	SM, SC-SM, SC	A-4, A-2-4	0	100	95-100	80-95	25-50	10-30	NP-10
	36-39	Loam-------------	CL-ML, CL	A-4, A-6	0-3	95-100	90-100	85-95	55-70	20-40	5-25
	39-60	Loam, fine sandy loam.	ML, CL-ML, CL, SC	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
Ridgeville------	0-12	Fine sandy loam	SM, SC-SM, SC, ML	A-4	0	95-100	90-100	80-95	40-70	<25	NP-10
	12-34	Fine sandy loam	SC-SM, SC, SM, CL-ML	A-4	0	95-100	90-100	80-95	40-70	10-30	NP-10
	34-60	Stratified sandy loam and fine sand.	SM, SC-SM, SC	A-3, A-4, A-2-4	0	90-100	90-100	55-95	0-50	<25	NP-10
Odell-----------	0-10	Loam-------------	CL-ML, CL, ML	A-4	0-1	95-100	90-100	85-95	55-70	15-40	NP-15
	10-30	Clay loam, loam	CL, CL-ML	A-6, A-4, A-7-6	0-1	95-100	90-100	85-95	55-80	20-50	5-30
	30-60	Loam, fine sandy loam.	CL-ML, CL, ML, SC	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
SyA--------------- Swygert	0-8	Silt loam--------	CL, ML, CL-ML	A-6, A-4	0	100	95-100	85-100	65-90	25-40	4-15
	8-12	Silty clay loam	CL, CH	A-6, A-7-6	0-1	98-100	95-100	85-95	70-85	40-55	15-35
	12-42	Silty clay-------	CH, CL	A-7-6	0-3	98-100	95-100	90-100	80-90	40-60	20-35
	42-60	Silty clay-------	CH, CL	A-7-6	0-3	98-100	95-100	85-95	75-85	40-55	15-30

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
SzB2, SzC2: Swygert Variant-	0-8	Loam-------------	CL, CL-ML, ML	A-4, A-6	0	95-100	90-100	85-95	55-70	15-40	NP-15
	8-16	Silty clay loam	CL, CH	A-6, A-7-6	0	98-100	95-100	85-95	70-85	40-55	15-35
	16-39	Silty clay--------	CH, CL	A-7-6	0-3	98-100	95-100	90-100	80-90	40-60	20-35
	39-60	Silty clay--------	CH, CL	A-7-6	0-3	98-100	95-100	85-95	75-85	40-55	15-30
Simonin----------	0-10	Loamy fine sand	SP-SM, SM	A-2-4, A-3	0	100	95-100	85-95	15-25	---	NP
	10-25	Loamy fine sand	SP-SM, SM	A-2-4, A-3	0	100	95-100	85-95	15-25	---	NP
	25-32	Fine sandy loam	SM, SC-SM, ML, SC	A-4	0	95-100	90-100	80-90	40-60	10-30	NP-10
	32-39	Clay-------------	CH, CL	A-7-6	0	100	100	85-100	75-90	45-65	25-45
	39-60	Clay-------------	CH, CL	A-7-6	0	100	100	85-100	75-90	40-55	15-30
TaA-------------- Tedrow	0-9	Loamy fine sand	SM, SP-SM	A-2-4, A-3	0	100	95-100	85-95	15-25	---	NP
	9-29	Sand-------------	SM, SP-SM	A-2-4, A-3	0	100	95-100	60-90	0-15	---	NP
	29-60	Sand-------------	SM, SP-SM	A-2-4, A-3	0	100	95-100	60-90	0-15	---	NP
To--------------- Toto	0-24	Sapric material	PT	A-8	0	---	---	---	---	---	---
	24-32	Marl-------------	OL	A-4	0	100	95-100	80-90	60-80	---	---
	32-38	Coprogenous earth	OL, OH	A-5	0	---	---	---	---	40-50	2-8
	38-60	Sand-------------	SM, SP-SM	A-3, A-2-4	0	98-100	95-100	60-90	0-15	---	NP
Ud--------------- Udorthents	0-60	Variable---------	ML, SM, SC-SM	A-4	0-10	95-100	90-100	65-95	35-75	<30	NP-15
	60-80	Variable---------	---	---	---	---	---	---	---	---	---
Wa--------------- Wallkill	0-9	Loam-------------	CL, CL-ML	A-4, A-6	0	100	100	90-100	55-80	20-40	5-25
	9-31	Loam-------------	CL-ML, CL	A-4, A-6	0	100	100	90-100	55-80	20-40	5-25
	31-60	Sapric material	PT, OH	A-8	0	---	---	---	---	---	---
Wc--------------- Wallkill Variant	0-10	Mucky silty clay	CL, CH, MH	A-6, A-7-5, A-7-6	0	100	100	95-100	85-100	40-60	15-40
	10-38	Silty clay--------	CL, CH	A-7-6	0	100	100	95-100	85-100	45-65	20-40
	38-60	Sapric material	PT	A-8	0	---	---	---	---	---	---
WeA-------------- Watseka	0-10	Loamy sand--------	SM, SP-SM	A-2-4, A-3	0	100	95-100	60-90	10-25	---	NP
	10-60	Loamy sand, sand	SM, SP-SM	A-3, A-2-4	0	100	95-100	60-90	0-25	<20	NP
WkA-------------- Wesley	0-14	Fine sandy loam	SM, SC-SM, SC	A-2-4, A-4	0	100	95-100	80-95	50-70	<25	NP-10
	14-34	Fine sandy loam	SM, SC-SM, SC	A-2-4, A-4	0	100	95-100	80-95	25-50	10-30	NP-10
	34-60	Silty clay loam	CL	A-6, A-7-6	0	100	100	95-100	80-100	30-50	10-25

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
ZaA: Zaborosky	0-8	Fine sand	SM, SP-SM, SP	A-2-4, A-3	0	100	100	85-95	0-15	---	NP
	8-23	Fine sand	SM, SP-SM, SP	A-2-4, A-3	0	100	100	85-95	0-15	---	NP
	23-32	Loamy sand	SM, SP-SM	A-2-4	0	100	100	75-90	10-25	---	NP
	32-49	Fine sand	SM, SP-SM, SP	A-2-4, A-3	0	100	100	85-95	0-15	---	NP
	49-60	Fine sand	SM, SP-SM, SP	A-2-4, A-3	0	100	100	85-95	0-15	---	NP
ZbB:											
Zaborosky	0-4	Fine sand	SM, SP-SM, SP	A-2-4, A-3	0	100	100	85-95	0-15	---	NP
	4-32	Fine sand	SM, SP-SM, SP	A-2-4, A-3	0	100	100	85-95	0-15	---	NP
	32-42	Loamy fine sand	SM, SP-SM	A-2-4, A-3	0	100	100	85-100	10-30	---	NP
	42-50	Fine sand	SM, SP-SM, SP	A-2-4, A-3	0	100	100	85-95	0-15	---	NP
	50-60	Fine sand	SM, SP-SM, SP	A-2-4, A-3	0	100	100	85-95	0-15	---	NP
Oakville	0-4	Fine sand	SM, SP-SM, SP	A-3, A-2-4	0	100	100	85-95	0-15	---	NP
	4-28	Fine sand	SM, SP-SM, SP	A-3, A-2-4	0	100	100	85-95	0-15	---	NP
	28-60	Fine sand	SP-SM, SM, SP	A-3, A-2-4	0	100	100	85-95	0-15	---	NP
Zg:											
Zadog	0-10	Loamy sand	SM, SP-SM	A-2-4, A-3	0	98-100	95-100	60-85	10-25	---	NP-7
	10-15	Fine sandy loam	SM, SC-SM, SC	A-2-4, A-4	0-10	90-100	85-100	75-95	25-50	10-30	NP-10
	15-30	Fine sandy loam, sandy clay loam.	SC-SM, CL, CL-ML, SC	A-2, A-4, A-6	0-10	90-100	85-95	75-95	25-55	10-60	5-20
	30-60	Fine sand	SM, SP-SM, SP	A-2-4, A-3	0	100	100	85-95	0-15	---	NP
Granby	0-10	Loamy fine sand	SM, SP-SM	A-2-4, A-3	0	100	100	85-95	15-25	---	NP
	10-31	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	95-100	65-95	0-15	---	NP
	31-60	Sand	SP-SM, SM	A-3, A-2-4	0	100	95-100	65-80	0-15	---	NP

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
Ac:											
Ackerman	0-8	---	0.20-0.80	0.2-0.6	0.35-0.45	6.6-7.3	---	----	1	2	30-40
	8-14	---	0.50-1.20	0.06-0.2	0.18-0.24	6.6-8.4	Moderate	----			5-20
	14-60	2-10	1.60-1.80	6.0-20	0.06-0.08	6.6-8.4	Low	0.15			.5-1
Martisco Variant	0-10	5-15	1.10-1.40	0.6-2.0	0.22-0.24	7.4-8.4	Low	0.28	2	3	8-14
	10-21	0-5	0.50-1.20	0.06-2.0	0.11-0.15	7.4-8.4	Low	----			2-5
	21-30	18-35	0.50-1.20	0.06-0.2	0.18-0.24	7.4-8.4	Low	----			5-20
	30-60	2-10	1.60-1.70	6.0-20	0.05-0.07	7.4-8.4	Low	0.15			1-3
Ad: Adrian	0-30	---	0.30-0.55	0.2-6.0	0.35-0.45	5.1-7.8	---	----	4	2	55-75
	30-60	2-10	1.55-1.75	6.0-20	0.03-0.10	5.6-8.4	Low	0.15			1-2
Af: Adrian Variant	0-11	0-10	0.30-0.55	0.2-6.0	0.35-0.45	6.6-7.3	---	----	3	2	25-40
	11-60	2-10	1.50-1.70	6.0-20	0.05-0.07	6.6-7.8	Low	0.15			1-2
Ap: Algansee	0-9	0-15	1.40-1.70	6.0-20	0.10-0.12	4.5-7.8	Low	0.17	5	2	2-4
	9-60	0-18	1.55-1.75	6.0-20	0.05-0.10	4.5-8.4	Low	0.17			.5-1
Ar: Aquolls	0-60	0-12	1.55-1.75	6.0-20	0.05-0.10	---	Low	0.17	5	2	4-8
AuA:											
Aubbeenaubbee	0-9	8-15	1.40-1.70	2.0-6.0	0.12-0.18	5.6-7.3	Low	0.24	5	3	1-2
	9-26	10-20	1.50-1.70	0.6-6.0	0.11-0.16	5.1-6.5	Low	0.24			.5-1
	26-43	27-32	1.50-1.70	0.06-2.0	0.14-0.18	5.6-7.3	Moderate	0.32			.5-1
	43-60	14-22	1.75-1.95	0.06-0.2	0.02-0.04	7.4-8.4	Low	0.32			.5-1
Whitaker	0-16	7-16	1.40-1.70	0.6-2.0	0.14-0.16	5.6-7.3	Low	0.24	5	3	1-3
	16-49	27-33	1.40-1.60	0.6-2.0	0.15-0.19	5.1-7.3	Moderate	0.37			.5-1
	49-60	3-18	1.50-1.70	0.6-6.0	0.14-0.16	6.1-8.4	Low	0.37			0-1
AyB: Ayr	0-10	3-10	1.40-1.70	6.0-20	0.10-0.12	6.1-7.3	Low	0.17	5	2	1-2
	10-35	2-10	1.55-1.75	6.0-20	0.06-0.11	6.1-7.3	Low	0.17			.5-1
	35-40	17-27	1.50-1.70	0.6-2.0	0.09-0.18	6.1-7.8	Low	0.37			.5-1
	40-60	10-18	1.50-1.70	0.6-2.0	0.08-0.15	7.4-8.4	Low	0.37			.5-1
AzA: Ayrmount	0-8	2-10	1.40-1.70	6.0-20	0.10-0.12	5.6-7.3	Low	0.17	5	2	1-2
	8-30	2-10	1.55-1.75	6.0-20	0.06-0.11	5.6-6.5	Low	0.17			.5-1
	30-33	20-25	1.50-1.70	2.0-6.0	0.15-0.20	5.6-6.5	Low	0.32			.5-1
	33-44	15-27	1.50-1.70	0.6-2.0	0.12-0.16	6.1-7.8	Low	0.32			0-1
	44-60	10-18	1.50-1.70	0.6-2.0	0.08-0.13	7.4-8.4	Low	0.37			
BbA:											
Barce	0-11	13-25	1.30-1.60	0.6-2.0	0.18-0.24	5.6-7.3	Low	0.32	5	5	2-4
	11-40	22-30	1.45-1.65	0.6-2.0	0.12-0.16	5.1-7.3	Moderate	0.32			.5-2
	40-48	18-27	1.55-1.75	0.2-0.6	0.12-0.16	6.6-7.8	Low	0.43			.5-1
	48-60	15-22	1.75-1.95	0.1-0.2	0.02-0.04	7.4-8.4	Low	0.43			0-.5
Corwin	0-11	12-22	1.30-1.60	0.6-2.0	0.18-0.24	5.1-7.3	Low	0.28	5	5	2-4
	11-32	27-35	1.40-1.60	0.6-2.0	0.15-0.19	5.1-6.5	Moderate	0.28			.5-2
	32-60	14-22	1.75-1.95	0.1-0.2	0.02-0.04	7.4-8.4	Low	0.37			.5-1

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodi-bility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
BfB2:											
Barce-----------	0-10	13-25	1.30-1.60	0.6-2.0	0.18-0.24	5.6-7.3	Low-----------	0.32	5	5	2-4
	10-42	22-30	1.45-1.65	0.6-2.0	0.12-0.16	5.1-7.3	Moderate-----	0.32			.5-2
	42-48	18-27	1.55-1.75	0.2-0.6	0.12-0.16	6.6-7.8	Low-----------	0.43			.5-1
	48-60	15-22	1.75-1.95	0.1-0.2	0.02-0.04	7.4-8.4	Low-----------	0.43			.5-1
Montmorenci-----	0-8	15-27	1.30-1.60	0.6-2.0	0.18-0.24	5.6-7.3	Low-----------	0.32	4	5	2-4
	8-25	27-35	1.50-1.70	0.6-2.0	0.12-0.16	5.6-7.3	Moderate-----	0.32			.5-2
	25-32	27-35	1.50-1.70	0.6-2.0	0.12-0.16	6.1-7.3	Moderate-----	0.32			.5-1
	32-37	17-27	1.55-1.75	0.2-0.6	0.05-0.12	6.6-7.8	Low-----------	0.32			.5-1
	37-60	14-22	1.75-1.95	0.01-0.2	0.02-0.04	7.4-8.4	Low-----------	0.32			.5-1
Bh:											
Barry-----------	0-12	5-18	1.30-1.60	2.0-6.0	0.13-0.17	6.1-7.8	Low-----------	0.20	5	3	4-7
	12-47	18-25	1.50-1.70	0.6-2.0	0.14-0.19	6.1-7.8	Low-----------	0.28			.5-2
	47-60	12-18	1.50-1.80	0.06-0.2	0.05-0.10	7.4-8.4	Low-----------	0.28			.5-1
Gilford---------	0-18	10-20	1.50-1.70	2.0-6.0	0.16-0.18	5.6-7.3	Low-----------	0.20	4	3	2-4
	18-30	8-17	1.60-1.80	2.0-6.0	0.12-0.14	5.6-7.3	Low-----------	0.20			1-2
	30-38	3-12	1.70-1.90	6.0-20	0.05-0.08	6.1-7.3	Low-----------	0.15			.5-1
	38-60	2-10	1.70-1.90	6.0-20	0.05-0.08	6.6-8.4	Low-----------	0.15			0-.5
BmB--------------	0-7	3-7	1.40-1.70	6.0-20	0.10-0.12	5.1-6.5	Low-----------	0.17	5	2	.5-1
Brems	7-36	2-6	1.60-1.80	6.0-20	0.05-0.08	4.5-6.0	Low-----------	0.17			0-.5
	36-60	2-6	1.60-1.80	6.0-20	0.05-0.07	5.1-6.5	Low-----------	0.17			0-.5
By---------------	0-16	35-40	1.30-1.50	0.2-0.6	0.19-0.21	5.6-7.8	Moderate-----	0.28	5	4	5-7
Bryce	16-53	42-52	1.40-1.60	0.06-0.2	0.11-0.15	6.6-8.4	High---------	0.28			
	53-60	40-50	1.70-1.90	0.01-0.2	0.01-0.02	7.4-8.4	High---------	0.28			
Co---------------	0-17	18-27	1.20-1.50	0.6-2.0	0.20-0.26	6.6-7.8	Low-----------	0.28	5	6	4-10
Comfrey	17-31	18-27	1.30-1.50	0.6-2.0	0.16-0.20	6.6-7.8	Moderate-----	0.28			1-4
	31-60	18-27	1.30-1.50	0.6-2.0	0.15-0.19	6.6-8.4	Moderate-----	0.28			.5-2
Cr---------------	0-8	2-10	1.40-1.70	6.0-20	0.10-0.12	6.1-7.3	Low-----------	0.17	5	2	1-3
Conrad	8-25	2-10	1.50-1.70	6.0-20	0.06-0.08	6.1-7.3	Low-----------	0.15			.5-1
	25-60	2-10	1.60-1.80	6.0-20	0.05-0.07	7.4-8.4	Low-----------	0.15			.5-1
CtA, CtB2--------	0-12	12-20	1.40-1.70	2.0-6.0	0.16-0.18	5.6-7.3	Low-----------	0.20	5	3	2-4
Corwin	12-35	27-35	1.50-1.70	0.6-2.0	0.15-0.19	5.1-7.3	Moderate-----	0.28			.5-2
	35-40	20-25	1.50-1.70	0.6-2.0	0.17-0.19	6.6-8.4	Low-----------	0.28			.5-1
	40-60	12-22	1.55-1.75	0.6-2.0	0.08-0.15	7.4-8.4	Low-----------	0.28			.5-1
Cv---------------	0-14	5-15	1.30-1.60	2.0-6.0	0.13-0.18	5.6-7.3	Low-----------	0.20	4	3	3-5
Craigmile	14-35	5-18	1.50-1.70	2.0-6.0	0.15-0.22	6.1-7.3	Low-----------	0.37			.5-1
	35-60	2-10	1.60-1.80	6.0-20	0.05-0.10	6.6-7.8	Low-----------	0.15			.5-1
Cz---------------	0-10	10-18	1.20-1.50	2.0-6.0	0.24-0.26	5.6-7.3	Low-----------	0.37	4	5	8-14
Craigmile	10-23	5-18	1.50-1.70	2.0-6.0	0.15-0.22	6.1-7.3	Low-----------	0.37			.5-1
	23-60	2-10	1.60-1.80	6.0-20	0.05-0.10	6.6-7.8	Low-----------	0.15			.5-1
DaA--------------	0-13	12-20	1.30-1.60	2.0-6.0	0.20-0.24	5.6-7.3	Low-----------	0.20	5	3	2-4
Darroch	13-36	27-35	1.50-1.70	0.2-0.6	0.15-0.19	5.6-7.3	Moderate-----	0.32			.5-1
	36-60	5-10	1.50-1.80	0.2-0.6	0.19-0.21	7.4-8.4	Low-----------	0.43			0-.5
DcA--------------	0-12	10-27	1.30-1.60	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.28	5	5	2-4
Darroch	12-16	18-35	1.40-1.60	0.6-2.0	0.18-0.22	5.6-7.3	Moderate-----	0.43			.5-1
	16-32	20-35	1.40-1.60	0.2-0.6	0.15-0.19	5.6-7.3	Moderate-----	0.32			.5-1
	32-60	5-10	1.50-1.70	0.2-0.6	0.19-0.21	7.4-8.4	Low-----------	0.43			0-.5

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
DdA------------- Darroch	0-10	8-15	1.30-1.60	2.0-6.0	0.20-0.24	5.6-7.3	Low----------	0.20	5	3	2-4
	10-35	20-35	1.40-1.60	0.6-2.0	0.15-0.19	5.6-7.3	Moderate-----	0.32			.5-1
	35-60	2-10	1.50-1.70	6.0-20	0.05-0.07	6.6-7.8	Low----------	0.15			0-.5
DgA------------- Darroch	0-10	15-27	1.30-1.60	0.6-2.0	0.20-0.24	5.6-7.3	Low----------	0.28	5	5	2-4
	10-22	27-35	1.40-1.60	0.2-0.6	0.15-0.20	5.6-7.3	Moderate-----	0.28			.5-1
	22-55	5-20	1.50-1.70	0.2-0.6	0.19-0.21	7.4-8.4	Low----------	0.28			.5-1
	55-60	14-22	1.75-1.95	0.01-0.2	0.02-0.04	7.4-8.4	Low----------	0.37			.5-1
EsB------------- Elston Variant	0-10	5-15	1.40-1.70	2.0-6.0	0.16-0.18	5.6-7.3	Low----------	0.20	4	3	2-4
	10-27	8-18	1.50-1.70	2.0-6.0	0.15-0.17	5.6-6.5	Low----------	0.24			.5-2
	27-41	2-12	1.55-1.75	6.0-20	0.09-0.11	5.6-7.3	Low----------	0.17			.5-1
	41-60	2-10	1.60-1.80	6.0-20	0.05-0.07	7.4-8.4	Low----------	0.15			.5-1
FeA------------- Foresman	0-12	12-20	1.30-1.60	2.0-6.0	0.18-0.24	5.6-7.3	Low----------	0.20	5	3	2-4
	12-39	20-35	1.40-1.60	0.6-2.0	0.16-0.20	5.1-7.3	Moderate-----	0.28			.5-2
	39-60	5-20	1.50-1.70	0.2-0.6	0.10-0.19	7.4-8.4	Low----------	0.43			.5-1
FoA, FoB2-------- Foresman	0-10	15-27	1.30-1.60	0.6-2.0	0.20-0.24	5.6-7.3	Low----------	0.28	5	5	2-4
	10-34	20-35	1.40-1.60	0.6-2.0	0.16-0.20	5.1-7.3	Moderate-----	0.28			.5-1
	34-60	5-20	1.50-1.70	0.2-0.6	0.10-0.19	7.4-8.4	Low----------	0.43			.5-1
FrA, FrB2-------- Foresman	0-10	8-18	1.40-1.70	2.0-6.0	0.16-0.18	5.6-7.3	Low----------	0.20	5	3	2-4
	10-33	20-30	1.40-1.60	0.6-2.0	0.15-0.19	5.6-7.3	Moderate-----	0.32			.5-2
	33-48	10-15	1.50-1.70	0.6-2.0	0.19-0.21	7.4-8.4	Low----------	0.37			.5-1
	48-60	10-18	1.50-1.70	0.6-2.0	0.08-0.13	7.4-8.4	Low----------	0.37			.5-1
FtA, FtB2-------- Foresman	0-11	15-27	1.30-1.60	0.6-2.0	0.20-0.24	5.6-7.3	Low----------	0.28	5	5	2-4
	11-36	18-35	1.40-1.60	0.6-2.0	0.15-0.19	5.1-7.3	Moderate-----	0.28			.5-2
	36-54	5-20	1.50-1.70	0.2-0.6	0.08-0.10	7.4-8.4	Low----------	0.43			.5-1
	54-60	14-22	1.75-1.95	0.06-0.2	0.05-0.10	7.4-8.4	Low----------	0.43			.5-1
FwA------------- Foresman	0-14	15-27	1.30-1.60	0.6-2.0	0.20-0.24	5.6-7.3	Low----------	0.28	5	5	2-4
	14-29	18-35	1.40-1.60	0.6-2.0	0.15-0.19	5.1-7.3	Moderate-----	0.28			.5-2
	29-45	5-20	1.50-1.70	0.2-0.6	0.07-0.19	7.4-8.4	Low----------	0.43			.5-1
	45-60	27-40	1.70-1.90	0.06-0.6	0.04-0.12	7.4-8.4	Moderate-----	0.43			.5-1
GbA:											
Gilboa----------	0-10	13-25	1.30-1.60	0.6-2.0	0.18-0.24	5.6-7.3	Low----------	0.28	5	6	3-5
	10-18	27-35	1.40-1.60	0.6-2.0	0.14-0.21	5.6-7.3	Moderate-----	0.37			.5-2
	18-41	27-35	1.50-1.70	0.6-2.0	0.12-0.16	5.6-7.3	Moderate-----	0.37			.5-1
	41-50	18-27	1.55-1.75	0.2-0.6	0.04-0.12	6.6-7.8	Low----------	0.37			.5-1
	50-60	15-22	1.75-1.95	0.01-0.2	0.02-0.04	7.4-8.4	Low----------	0.37			.5-1
Odell-----------	0-13	18-27	1.30-1.60	0.6-2.0	0.18-0.24	5.6-7.3	Low----------	0.28	4	6	2-4
	13-29	27-35	1.50-1.70	0.6-2.0	0.12-0.16	5.6-7.3	Moderate-----	0.28			.5-2
	29-35	12-25	1.55-1.75	0.2-0.6	0.08-0.15	6.6-8.4	Low----------	0.37			.5-1
	35-60	10-20	1.75-1.95	0.01-0.2	0.02-0.04	7.4-8.4	Low----------	0.37			.5-1
Gf-------------- Gilford	0-15	10-20	1.40-1.70	2.0-6.0	0.10-0.21	5.6-7.3	Low----------	0.20	4	3	2-4
	15-34	8-20	1.50-1.70	2.0-6.0	0.09-0.18	5.6-7.3	Low----------	0.20			1-2
	34-60	2-10	1.70-1.90	6.0-20	0.05-0.08	6.6-8.4	Low----------	0.15			0-.5
GhB------------- Glenhall	0-9	15-22	1.30-1.60	0.6-2.0	0.18-0.24	5.6-7.3	Low----------	0.28	5	6	2-4
	9-30	27-35	1.40-1.60	0.6-2.0	0.13-0.19	5.6-6.5	Moderate-----	0.28			.5-1
	30-37	19-25	1.40-1.60	0.6-2.0	0.14-0.19	5.6-6.5	Low----------	0.28			.5-1
	37-49	15-20	1.50-1.70	0.6-2.0	0.09-0.12	6.1-7.3	Low----------	0.17			.5-1
	49-60	2-18	1.65-1.75	2.0-6.0	0.08-0.14	7.4-8.4	Low----------	0.17			0-.5

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
Gn----------------- Granby	0-10	2-10	1.20-1.50	6.0-20	0.11-0.13	5.6-7.3	Low-----------	0.17	5	2	8-14
	10-24	0-10	1.50-1.70	6.0-20	0.05-0.12	5.6-7.8	Low-----------	0.17			.5-3
	24-60	0-10	1.50-1.70	6.0-20	0.05-0.09	6.6-8.4	Low-----------	0.17			0-.5
Gt----------------- Granby	0-14	2-10	1.30-1.60	6.0-20	0.10-0.12	5.6-7.3	Low-----------	0.17	5	2	2-4
	14-37	0-10	1.50-1.70	6.0-20	0.05-0.12	5.6-7.8	Low-----------	0.17			.5-2
	37-60	0-10	1.50-1.70	6.0-20	0.05-0.09	6.6-8.4	Low-----------	0.17			0-.5
Ho----------------- Houghton	0-60	---	0.15-0.45	0.2-6.0	0.35-0.45	5.6-7.8	-------------	----	5	2	>70
Ir----------------- Iroquois	0-11	16-20	1.40-1.70	0.6-2.0	0.16-0.18	5.6-7.3	Low-----------	0.20	4	3	2-4
	11-32	20-25	1.40-1.60	0.6-2.0	0.15-0.19	5.6-7.3	Low-----------	0.32			.5-2
	32-36	27-40	1.40-1.60	0.6-2.0	0.16-0.19	5.6-7.3	Moderate------	0.32			.5-1
	36-60	40-60	1.45-1.65	0.06-0.2	0.08-0.12	7.4-8.4	High----------	0.32			.5-1
Ke----------------- Kentland	0-12	0-10	1.40-1.70	6.0-20	0.08-0.10	6.1-7.3	Low-----------	0.15	5	1	8-16
	12-16	0-10	0.30-0.55	0.6-2.0	0.35-0.45	7.4-8.4	-------------	----			75-99
	16-60	0-10	1.60-1.80	6.0-20	0.05-0.07	7.4-8.4	Low-----------	0.15			.5-2
MeA:											
Martinsville-----	0-9	5-15	1.40-1.70	2.0-6.0	0.10-0.21	5.1-7.3	Low-----------	0.24	5	3	1-2
	9-31	27-33	1.40-1.60	0.6-2.0	0.16-0.20	5.1-6.5	Moderate------	0.37			.5-1
	31-46	15-25	1.50-1.70	0.6-2.0	0.12-0.17	5.1-6.5	Low-----------	0.24			.5-1
	46-60	2-20	1.55-1.75	0.6-6.0	0.08-0.17	5.6-8.4	Low-----------	0.24			.5-1
Williamstown-----	0-8	14-26	1.30-1.60	0.6-2.0	0.18-0.24	5.6-7.3	Low-----------	0.37	4	5	1-2
	8-30	27-35	1.50-1.70	0.6-2.0	0.15-0.21	5.6-7.3	Moderate------	0.37			.5-1
	30-35	18-27	1.50-1.70	0.6-2.0	0.15-0.19	6.1-7.8	Low-----------	0.37			.5-1
	35-60	14-22	1.75-1.95	0.01-0.2	0.02-0.04	7.4-8.4	Low-----------	0.37			0-.5
MeB2:											
Martinsville-----	0-9	10-15	1.40-1.70	2.0-6.0	0.13-0.16	5.1-7.3	Low-----------	0.24	5	3	1-2
	9-31	27-33	1.40-1.60	0.6-2.0	0.16-0.20	5.1-6.5	Moderate------	0.37			.5-1
	31-46	15-25	1.50-1.70	0.6-2.0	0.12-0.17	5.1-6.5	Low-----------	0.24			.5-1
	46-60	2-20	1.55-1.75	0.6-6.0	0.08-0.17	5.6-8.4	Low-----------	0.24			.5-1
Williamstown-----	0-8	14-26	1.50-1.60	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.37	4	5	1-2
	8-30	27-35	1.50-1.70	0.6-2.0	0.15-0.21	5.6-7.3	Moderate------	0.37			.5-1
	30-35	18-27	1.50-1.70	0.6-2.0	0.15-0.19	6.1-7.8	Low-----------	0.37			.5-1
	35-60	14-22	1.75-1.95	0.01-0.2	0.02-0.04	7.4-8.4	Low-----------	0.37			0-.5
Mh----------------- Maumee	0-18	2-10	1.50-1.80	6.0-20	0.10-0.12	6.1-7.3	Low-----------	0.17	5	2	2-4
	18-60	2-10	1.60-1.80	6.0-20	0.05-0.07	6.1-8.4	Low-----------	0.17			.5-1
Mk----------------- Maumee	0-18	2-10	1.10-1.40	6.0-20	0.15-0.18	6.1-7.3	Low-----------	0.17	5	2	8-14
	18-60	2-10	1.60-1.80	6.0-20	0.05-0.07	6.1-8.4	Low-----------	0.17			.5-2
MnC2, MnE--------- Miami	0-8	15-27	1.30-1.60	0.6-2.0	0.18-0.24	5.6-7.3	Low-----------	0.37	4	5	1-3
	8-29	27-35	1.50-1.70	0.6-2.0	0.12-0.16	5.1-6.0	Moderate------	0.37			.5-1
	29-33	20-27	1.50-1.70	0.6-2.0	0.12-0.16	6.6-7.8	Low-----------	0.37			.5-1
	33-60	14-22	1.75-1.95	0.01-0.2	0.02-0.04	7.4-8.4	Low-----------	0.37			.5-1
Mp----------------- Montgomery	0-14	35-40	1.30-1.60	0.2-0.6	0.20-0.23	6.1-7.8	Moderate------	0.28	5	4	3-6
	14-44	35-55	1.40-1.60	0.06-0.2	0.11-0.18	6.1-7.8	High----------	0.37			.5-2
	44-60	35-48	1.45-1.65	0.06-0.2	0.12-0.18	7.4-8.4	Moderate------	0.37			.5-1
MrB2--------------- Montmorenci	0-9	15-27	1.30-1.60	2.0-6.0	0.18-0.24	5.6-7.3	Low-----------	0.20	5	3	2-4
	9-33	27-35	1.50-1.70	0.6-2.0	0.15-0.19	5.6-7.3	Moderate------	0.32			.5-1
	33-60	10-18	1.75-1.95	0.01-0.2	0.02-0.04	7.4-8.4	Low-----------	0.37			.5-1

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
MuA---------------- Morocco	0-9	1-6	1.40-1.70	6.0-20	0.10-0.12	5.1-6.5	Low-----------	0.17	5	2	.5-2
	9-60	1-6	1.50-1.70	6.0-20	0.05-0.07	4.5-6.0	Low-----------	0.15			.5-1
NsA, NsB---------- Nesius	0-15	5-12	1.40-1.70	6.0-20	0.10-0.12	6.6-7.3	Low-----------	0.17	5	2	1-3
	15-53	3-10	1.55-1.75	6.0-20	0.06-0.09	6.6-7.3	Low-----------	0.15			.5-1
	53-60	1-5	1.55-1.75	6.0-20	0.05-0.07	6.6-7.3	Low-----------	0.15			0-.5
Nw----------------- Newton	0-5	3-7	1.40-1.70	6.0-20	0.10-0.12	4.5-6.0	Low-----------	0.17	5	2	2-4
	5-60	2-7	1.60-1.80	6.0-20	0.05-0.07	4.5-6.0	Low-----------	0.17			.5-1
OaB, OaC---------- Oakville	0-6	0-10	1.40-1.70	6.0-20	0.07-0.09	4.5-7.3	Low-----------	0.15	5	1	.5-2
	6-36	0-10	1.50-1.70	6.0-20	0.06-0.10	4.5-7.3	Low-----------	0.15			.5-1
	36-60	0-10	1.50-1.70	6.0-20	0.05-0.07	5.6-7.3	Low-----------	0.15			0-.5
ObB---------------- Oakville	0-8	0-10	1.40-1.70	6.0-20	0.07-0.09	4.5-7.3	Low-----------	0.15	5	1	.5-2
	8-34	0-10	1.50-1.70	6.0-20	0.06-0.08	4.5-7.3	Low-----------	0.15			.5-1
	34-60	0-10	1.50-1.70	6.0-20	0.05-0.07	5.6-7.3	Low-----------	0.15			0-.5
OcC2-------------- Octagon	0-7	10-20	1.30-1.50	0.6-2.0	0.18-0.24	5.6-7.3	Low-----------	0.28	5	5	2-4
	7-25	18-30	1.50-1.70	0.6-2.0	0.15-0.24	5.6-7.3	Moderate-----	0.28			.5-2
	25-60	14-22	1.50-1.70	0.2-0.6	0.08-0.13	7.4-8.4	Low-----------	0.28			.5-1
OkB2:											
Octagon----------	0-9	8-15	1.40-1.70	0.6-2.0	0.16-0.18	5.6-7.3	Low-----------	0.20	5	3	2-4
	9-31	18-30	1.50-1.70	0.6-2.0	0.12-0.16	5.6-7.3	Moderate-----	0.28			.5-2
	31-60	10-18	1.50-1.70	0.2-0.6	0.08-0.15	7.4-8.4	Low-----------	0.28			.5-1
Ayr---------------	0-8	3-10	1.40-1.70	6.0-20	0.10-0.12	6.1-7.3	Low-----------	0.17	5	2	1-2
	8-34	2-10	1.45-1.65	6.0-20	0.06-0.11	6.1-7.3	Low-----------	0.17			.5-1
	34-37	17-27	1.50-1.70	0.6-2.0	0.09-0.18	6.1-7.8	Low-----------	0.37			.5-1
	37-60	10-18	1.50-1.70	0.6-2.0	0.08-0.15	7.4-8.4	Low-----------	0.37			.5-1
OnA, OnB2--------- Onarga	0-10	5-15	1.40-1.70	2.0-6.0	0.16-0.18	5.6-7.3	Low-----------	0.20	5	3	2-4
	10-50	15-18	1.50-1.70	2.0-6.0	0.12-0.17	5.1-6.5	Low-----------	0.24			.5-1
	50-60	2-10	1.55-1.75	6.0-20	0.08-0.12	5.1-7.3	Low-----------	0.24			.5-1
OpB2-------------- Onarga	0-9	5-15	1.40-1.70	2.0-6.0	0.16-0.18	5.6-7.3	Low-----------	0.20	4	3	2-4
	9-38	8-18	1.50-1.70	2.0-6.0	0.12-0.17	5.6-7.3	Low-----------	0.24			.5-2
	38-44	2-10	1.55-1.75	6.0-20	0.05-0.16	5.6-7.8	Low-----------	0.24			.5-1
	44-60	14-22	1.55-1.75	0.2-0.6	0.05-0.10	7.4-8.4	Low-----------	0.37			0-.5
OrB--------------- Ormas	0-10	5-12	1.40-1.70	6.0-20	0.10-0.12	5.6-7.3	Low-----------	0.17	5	2	1-3
	10-24	3-10	1.50-1.70	6.0-20	0.04-0.10	5.6-6.5	Low-----------	0.17			.5-1
	24-45	10-20	1.50-1.70	2.0-6.0	0.10-0.18	5.1-7.3	Low-----------	0.17			.5-1
	45-60	1-5	1.60-1.80	>20	0.03-0.05	7.4-8.4	Low-----------	0.15			0-.5
PaA, PaB---------- Papineau	0-10	10-18	1.40-1.70	2.0-6.0	0.14-0.17	5.6-7.3	Low-----------	0.20	4	3	2-4
	10-37	27-32	1.45-1.65	0.6-2.0	0.13-0.17	5.6-7.3	Moderate-----	0.28			.5-2
	37-60	45-55	1.55-1.65	0.06-0.2	0.08-0.12	6.6-8.4	High----------	0.28			.5-1
Pp---------------- Peotone	0-11	30-40	1.25-1.45	0.2-0.6	0.21-0.23	5.6-7.3	Moderate-----	0.28	5	4	5-7
	11-46	35-40	1.40-1.60	0.06-0.2	0.11-0.20	6.1-7.8	Moderate-----	0.28			2-4
	46-60	27-40	1.45-1.65	0.2-0.6	0.15-0.22	6.6-8.4	Moderate-----	0.43			1-2
Pt. Pits											
Pu, Px, Py-------- Prochaska	0-19	3-8	1.40-1.70	6.0-20	0.10-0.12	5.1-7.3	Low-----------	0.17	5	2	2-5
	19-33	2-10	1.50-1.70	6.0-20	0.04-0.09	5.6-7.3	Low-----------	0.17			.5-2
	33-60	1-8	1.50-1.70	6.0-20	0.02-0.06	5.6-7.3	Low-----------	0.17			.5-1

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
RtA---------------- Ridgeville	0-10	10-15	1.40-1.70	0.6-2.0	0.10-0.21	5.6-6.5	Low-----------	0.20	5	3	2-4
	10-40	14-18	1.50-1.70	0.6-2.0	0.09-0.18	5.6-6.5	Low-----------	0.20			.5-1
	40-60	3-10	1.55-1.75	2.0-6.0	0.09-0.13	6.6-7.8	Low-----------	0.20			.5-1
RuA---------------- Ridgeville	0-13	5-15	1.40-1.70	2.0-6.0	0.10-0.21	5.6-7.3	Low-----------	0.20	5	3	2-4
	13-46	12-18	1.50-1.70	0.6-6.0	0.09-0.18	5.6-7.3	Low-----------	0.32			.5-1
	46-54	2-10	1.55-1.75	2.0-6.0	0.08-0.13	6.6-7.8	Low-----------	0.24			.5-1
	54-60	15-22	1.55-1.75	0.2-0.6	0.05-0.10	7.4-8.4	Low-----------	0.37			0-.5
Rv----------------- Ross	0-30	15-27	1.20-1.50	0.6-2.0	0.20-0.26	6.1-7.8	Low-----------	0.32	5	5	3-5
	30-39	18-27	1.30-1.50	0.6-2.0	0.16-0.22	6.1-8.4	Low-----------	0.32			.5-2
	39-60	5-25	1.40-1.60	0.6-6.0	0.05-0.18	6.1-8.4	Low-----------	0.32			.5-1
Sd----------------- Sawabash	0-6	27-35	1.30-1.60	0.6-2.0	0.21-0.23	7.4-8.4	Low-----------	0.28	5	4L	4-8
	6-35	27-35	1.40-1.60	0.6-2.0	0.18-0.20	7.4-8.4	Moderate------	0.28			2-4
	35-46	27-35	1.40-1.60	0.6-2.0	0.18-0.20	7.4-8.4	Moderate------	0.43			1-3
	46-60	27-35	1.50-1.70	0.6-2.0	0.18-0.20	7.4-8.4	Moderate------	0.43			1-3
SeA---------------- Seafield	0-8	5-14	1.40-1.70	2.0-6.0	0.13-0.18	5.1-7.3	Low-----------	0.24	4	3	2-3
	8-31	10-18	1.40-1.60	2.0-6.0	0.13-0.18	5.1-6.0	Low-----------	0.24			.5-1
	31-60	4-8	1.50-1.70	6.0-20.0	0.06-0.08	5.6-7.3	Low-----------	0.15			.5-1
Sf----------------- Selma	0-14	12-20	1.30-1.60	0.6-2.0	0.16-0.18	6.1-7.8	Low-----------	0.20	5	3	4-6
	14-38	18-27	1.40-1.60	0.6-2.0	0.17-0.19	6.1-7.3	Low-----------	0.28			.5-2
	38-60	7-18	1.60-1.70	2.0-6.0	0.07-0.21	7.4-8.4	Low-----------	0.28			.5-1
Sg----------------- Selma	0-15	20-27	1.30-1.60	0.6-2.0	0.20-0.24	6.1-7.8	Low-----------	0.28	5	6	4-6
	15-45	18-27	1.40-1.60	0.6-2.0	0.15-0.19	6.1-8.4	Moderate------	0.28			.5-2
	45-60	7-18	1.50-1.70	2.0-6.0	0.07-0.19	6.6-8.4	Low-----------	0.28			.5-1
Sh----------------- Selma	0-17	20-27	1.30-1.60	0.6-2.0	0.20-0.22	6.1-7.3	Low-----------	0.24	5	6	4-6
	17-27	27-35	1.40-1.60	0.6-2.0	0.15-0.19	6.1-7.3	Moderate------	0.32			.5-2
	27-42	18-25	1.40-1.60	0.6-2.0	0.17-0.19	6.6-7.8	Low-----------	0.24			.5-1
	42-50	2-10	1.60-1.80	6.0-20	0.05-0.07	7.4-8.4	Low-----------	0.15			.5-1
	50-60	2-10	1.60-1.80	6.0-20	0.05-0.07	7.4-8.4	Low-----------	0.15			.5-1
Sk----------------- Selma	0-16	27-30	1.30-1.60	0.6-2.0	0.17-0.23	6.1-7.8	Moderate------	0.28	5	7	2-6
	16-48	27-35	1.40-1.60	0.6-2.0	0.15-0.19	5.6-7.8	Moderate------	0.28			.5-2
	48-55	5-20	1.50-1.70	0.6-2.0	0.19-0.21	5.6-7.8	Low-----------	0.28			.5-1
	55-60	14-22	1.50-1.70	0.06-0.6	0.05-0.19	7.4-8.4	Low-----------	0.37			.5-1
SmB---------------- Simonin	0-10	4-14	1.40-1.70	6.0-20	0.10-0.12	6.1-7.3	Low-----------	0.17	4	2	1-3
	10-28	4-14	1.50-1.70	6.0-20	0.09-0.11	6.1-7.3	Low-----------	0.17			.5-2
	28-34	10-18	1.50-1.70	2.0-6.0	0.12-0.17	5.6-6.5	Low-----------	0.20			.5-1
	34-39	45-55	1.55-1.75	0.06-0.2	0.08-0.10	6.1-7.3	High----------	0.28			.5-1
	39-60	45-55	1.55-1.75	0.06-0.2	0.02-0.05	7.4-8.4	High----------	0.28			.5-1
SrB---------------- Sparta	0-9	3-10	1.40-1.70	2.0-6.0	0.09-0.12	5.1-7.3	Low-----------	0.17	5	2	1-2
	9-31	1-8	1.50-1.70	6.0-20	0.05-0.11	5.1-6.5	Low-----------	0.17			.5-1
	31-60	0-5	1.50-1.70	6.0-20	0.04-0.07	5.1-6.0	Low-----------	0.17			0-.5
SwA---------------- Strole	0-12	27-40	1.25-1.55	0.6-2.0	0.17-0.23	5.6-7.3	Moderate------	0.43	3	7	3-6
	12-30	40-60	1.40-1.60	0.06-0.2	0.09-0.13	5.6-7.8	High----------	0.32			1-3
	30-60	40-60	1.30-1.60	0.06-0.2	0.08-0.12	7.4-8.4	High----------	0.32			.5-1
SxA:											
Sumava------------	0-10	8-12	1.40-1.70	2.0-6.0	0.10-0.21	6.1-7.3	Low-----------	0.20	5	3	2-4
	10-29	8-15	1.50-1.70	2.0-6.0	0.09-0.18	6.6-7.3	Low-----------	0.20			.5-2
	29-36	8-15	1.50-1.70	2.0-6.0	0.09-0.18	7.4-7.8	Low-----------	0.20			.5-1
	36-39	10-15	1.50-1.70	0.6-2.0	0.08-0.13	7.4-8.4	Low-----------	0.37			.5-1
	39-60	8-15	1.50-1.70	0.2-0.6	0.08-0.15	7.4-8.4	Low-----------	0.37			0-.5

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
SxA:											
Ridgeville------	0-12	10-15	1.40-1.70	0.6-2.0	0.10-0.21	5.6-6.5	Low-----------	0.20	5	3	2-4
	12-34	14-18	1.50-1.70	0.6-2.0	0.09-0.19	5.6-6.5	Low-----------	0.20			.5-2
	34-60	3-10	1.55-1.75	2.0-6.0	0.09-0.13	6.6-7.8	Low-----------	0.20			.5-1
Odell-----------	0-10	10-20	1.30-1.60	0.6-2.0	0.18-0.24	5.6-7.3	Low-----------	0.28	5	5	2-4
	10-30	20-33	1.40-1.60	0.6-2.0	0.12-0.16	5.6-7.3	Moderate-----	0.28			.5-2
	30-60	10-15	1.50-1.70	0.2-0.6	0.08-0.13	7.4-8.4	Low-----------	0.28			.5-1
SyA--------------	0-8	24-27	1.20-1.30	0.6-2.0	0.22-0.24	5.6-7.3	Moderate-----	0.37	3	6	3-5
Swygert	8-12	27-35	1.20-1.30	0.6-2.0	0.22-0.24	5.6-7.3	Moderate-----	0.37			.5-3
	12-42	45-55	1.40-1.60	0.06-0.2	0.05-0.12	5.6-8.4	High----------	0.28			.5-3
	42-60	40-55	1.55-1.75	<0.06	0.01-0.02	7.4-8.4	High----------	0.28			.5-1
SzB2, SzC2:											
Swygert Variant-	0-8	15-27	1.30-1.60	0.6-2.0	0.18-0.22	5.6-7.3	Low-----------	0.28	3	5	1-2
	8-16	40-55	1.40-1.60	0.2-0.6	0.18-0.20	6.1-7.3	Moderate-----	0.43			.5-1
	16-39	40-55	1.55-1.75	0.06-0.2	0.08-0.10	6.6-7.8	High----------	0.28			.5-1
	39-60	40-55	1.55-1.75	0.06-0.2	0.02-0.05	7.4-8.4	High----------	0.28			.5-1
Simonin---------	0-10	5-15	1.40-1.70	6.0-20	0.10-0.12	5.6-7.3	Low-----------	0.17	4	2	1-2
	10-25	2-10	1.50-1.70	6.0-20	0.06-0.08	5.6-7.3	Low-----------	0.17			.5-1
	25-32	10-18	1.50-1.70	2.0-6.0	0.12-0.14	5.6-6.5	Low-----------	0.20			.5-1
	32-39	40-55	1.55-1.75	0.06-0.2	0.08-0.10	6.6-7.8	High----------	0.28			.5-1
	39-60	40-55	1.55-1.75	0.06-0.2	0.08-0.10	7.4-8.4	High----------	0.28			.5-1
TaA--------------	0-9	2-10	1.40-1.70	6.0-20	0.08-0.12	6.1-7.3	Low-----------	0.17	5	2	1-3
Tedrow	9-29	2-8	1.50-1.70	6.0-20	0.07-0.11	5.6-7.8	Low-----------	0.17			.5-1
	29-60	1-8	1.50-1.70	6.0-20	0.05-0.07	6.6-8.4	Low-----------	0.17			0-.5
To---------------	0-24	---	0.30-0.55	0.2-6.0	0.35-0.45	5.6-7.3	--------------	----	4	2	55-75
Toto	24-32	---	0.50-1.20	0.06-0.2	0.18-0.24	6.6-7.8	Moderate-----	----			5-20
	32-38	---	0.50-1.10	0.06-2.0	0.11-0.15	7.4-8.4	--------------	----			4-10
	38-60	1-4	1.60-1.80	6.0-20	0.05-0.07	6.6-8.4	Low-----------	0.15			.5-2
Ud---------------	0-60	2-18	1.50-1.70	0.6-6.0	0.08-0.14	6.6-9.0	Low-----------	0.24	5	3	<1
Udorthents	60-80	---	---	---	---	---	--------------	----			
Wa---------------	0-9	10-27	1.20-1.50	0.6-2.0	0.18-0.24	5.1-7.8	Low-----------	0.37	5	5	3-8
Wallkill	9-31	15-27	1.35-1.55	0.6-2.0	0.15-0.20	5.1-7.8	Low-----------	0.32			2-4
	31-60	---	0.25-0.45	2.0-20	0.35-0.45	5.6-7.8	--------------	----			55-75
Wc---------------	0-10	40-45	1.20-1.50	0.6-2.0	0.23-0.25	5.1-7.3	Moderate-----	0.28	5	4	8-15
Wallkill Variant	10-38	40-45	1.40-1.60	0.2-0.6	0.13-0.22	5.1-7.3	Moderate-----	0.37			2-5
	38-60	---	0.25-0.45	0.2-6.0	0.35-0.45	5.6-7.3	--------------	----			55-75
WeA--------------	0-10	8-13	1.40-1.70	6.0-20	0.10-0.12	5.6-7.3	Low-----------	0.17	5	2	1-3
Watseka	10-60	1-10	1.50-1.70	6.0-20	0.05-0.10	5.1-7.3	Low-----------	0.17			.5-1
WkA--------------	0-14	8-15	1.40-1.70	2.0-6.0	0.15-0.18	5.6-7.3	Low-----------	0.24	3	3	3-4
Wesley	14-34	3-15	1.50-1.70	2.0-20	0.06-0.14	5.6-7.3	Low-----------	0.20			.5-1
	34-60	27-33	1.40-1.60	0.2-0.6	0.09-0.12	6.6-8.4	Moderate-----	0.37			.5-1
ZaA--------------	0-8	2-10	1.40-1.70	6.0-20	0.07-0.09	5.1-7.3	Low-----------	0.15	5	1	1-3
Zaborosky	8-23	0-5	1.60-1.80	6.0-20	0.06-0.08	4.5-6.5	Low-----------	0.15			.5-1
	23-32	2-10	1.55-1.75	6.0-20	0.09-0.12	4.5-6.0	Low-----------	0.15			0-.5
	32-49	1-5	1.60-1.80	6.0-20	0.05-0.07	4.5-6.0	Low-----------	0.15			0-.5
	49-60	2-5	1.60-1.80	6.0-20	0.05-0.07	6.6-7.3	Low-----------	0.15			0-.5

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
ZbB:											
Zaborosky--------	0-4	2-10	1.40-1.70	6.0-20	0.07-0.09	5.1-7.3	Low-----------	0.15	5	1	1-3
	4-32	0-5	1.60-1.80	6.0-20	0.06-0.08	4.5-6.5	Low-----------	0.15			.5-1
	32-42	2-10	1.55-1.75	6.0-20	0.09-0.12	4.5-6.0	Low-----------	0.15			0-.5
	42-50	1-5	1.60-1.80	6.0-20	0.05-0.07	4.5-6.0	Low-----------	0.15			0-.5
	50-60	2-5	1.60-1.80	6.0-20	0.05-0.07	6.6-7.3	Low-----------	0.15			0-.5
Oakville---------	0-4	0-10	1.40-1.70	6.0-20	0.07-0.09	4.5-7.3	Low-----------	0.15	5	1	.5-2
	4-28	0-10	1.50-1.70	6.0-20	0.06-0.08	4.5-7.3	Low-----------	0.15			.5-1
	28-60	0-10	1.50-1.70	6.0-20	0.05-0.07	5.6-7.3	Low-----------	0.15			0-.5
Zg:											
Zadog------------	0-10	5-15	1.40-1.70	0.6-6.0	0.16-0.18	6.1-7.3	Low-----------	0.20	4	3	1-4
	10-15	8-18	1.45-1.65	0.6-6.0	0.13-0.18	6.1-7.3	Low-----------	0.17			.5-2
	15-30	12-30	1.45-1.65	0.6-2.0	0.13-0.19	6.1-7.3	Low-----------	0.32			.5-1
	30-60	1-5	1.60-1.80	6.0-20	0.05-0.10	7.4-8.4	Low-----------	0.17			0-.5
Granby-----------	0-10	2-14	1.20-1.50	6.0-20	0.10-0.12	5.6-7.3	Low-----------	0.17	5	2	2-4
	10-31	0-14	1.50-1.70	6.0-20	0.05-0.12	5.6-7.8	Low-----------	0.17			.5-2
	31-60	0-10	1.50-1.70	6.0-20	0.05-0.09	6.6-8.4	Low-----------	0.17			0-.5

TABLE 18.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Subsidence		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Initial	Total		Uncoated steel	Concrete
					Ft			In	In			
Ac:												
Ackerman	A/D	None	---	---	+.5-1.0	Apparent	Nov-May	---	---	High	High	Low.
Martisco Variant	B/D	None	---	---	+.5-1.0	Apparent	Nov-Jun	---	---	High	High	Low.
Ad Adrian	A/D	None	---	---	+1-1.0	Apparent	Nov-May	---	29-33	High	High	Moderate.
Af Adrian Variant	A/D	None	---	---	+.5-1.0	Apparent	Nov-May	2-7	10-16	High	High	Low.
Ap Algansee	B	Frequent	Long	Nov-May	1.0-2.0	Apparent	Nov-May	---	---	Moderate	Low	Low.
Ar Aquolls	---	None	---	---	+.5-2.0	Apparent	Jan-Dec	---	---	---	---	---
AuA:												
Aubbeenaubbee	B	None	---	---	1.0-3.0	Apparent	Jan-Apr	---	---	High	High	Moderate.
Whitaker	C	None	---	---	1.0-3.0	Apparent	Jan-Apr	---	---	High	High	Moderate.
AyB Ayr	B	None	---	---	>6.0	---	---	---	---	Moderate	Moderate	High.
AzA Ayrmount	B	None	---	---	2.5-4.0	Apparent	Nov-May	---	---	Moderate	Moderate	Moderate.
BbA:												
Barce	B	None	---	---	3.0-4.0	Perched	Dec-May	---	---	Moderate	High	Moderate.
Corwin	B	None	---	---	2.0-4.0	Perched	Jan-Apr	---	---	Moderate	High	Moderate.
BfB2:												
Barce	B	None	---	---	3.0-4.0	Perched	Dec-May	---	---	Moderate	High	Moderate.
Montmorenci	B	None	---	---	2.0-4.0	Apparent	Dec-May	---	---	Moderate	High	Moderate.
Bh:												
Barry	B/D	None	---	---	+1-1.0	Apparent	Nov-May	---	---	High	High	Low.
Gilford	B/D	None	---	---	+.5-1.0	Apparent	Dec-May	---	---	High	High	Moderate.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro- logic group	Flooding			High water table			Subsidence		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Initial	Total		Uncoated steel	Concrete
					Ft			In	In			
BmB---------------- Brems	A	None---------	---	---	2.0-3.0	Apparent	Jan-Apr	---	---	Low-------	Low-------	High.
By----------------- Bryce	D	None---------	---	---	+1-1.0	Apparent	Feb-Jun	---	---	High------	High------	Low.
Co----------------- Comfrey	B/D	Frequent-----	Brief or long.	Feb-May	0-3.0	Apparent	Feb-Jul	---	---	High------	High------	Low.
Cr----------------- Conrad	A/D	None---------	---	---	+.5-1.0	Apparent	Dec-May	---	---	Moderate	High------	Low.
CtA, CtB2---------- Corwin	B	None---------	---	---	2.0-4.0	Perched	Jan-Apr	---	---	Moderate	High------	Moderate.
Cv, Cz------------- Craigmile	B/D	Frequent-----	Brief or long.	Nov-Jun	+1-1.0	Apparent	Oct-Jun	---	---	High------	High------	Moderate.
DaA, DcA----------- Darroch	B	None---------	---	---	1.0-3.0	Apparent	Dec-May	---	---	High------	High------	Moderate.
DdA---------------- Darroch	B	None---------	---	---	1.0-3.0	Apparent	Nov-May	---	---	High------	High------	Moderate.
DgA---------------- Darroch	B	None---------	---	---	1.0-3.0	Apparent	Jan-Apr	---	---	High------	High------	Moderate.
EsB---------------- Elston Variant	B	None---------	---	---	2.5-4.0	Apparent	Nov-May	---	---	Moderate	Moderate	Moderate.
FeA, FoA, FoB2----- Foresman	B	None---------	---	---	3.0-6.0	Apparent	Dec-May	---	---	Moderate	High------	Moderate.
FrA, FrB2---------- Foresman	B	None---------	---	---	3.0-4.0	Apparent	Nov-May	---	---	Moderate	High------	Moderate.
FtA, FtB2, FwA----- Foresman	B	None---------	---	---	3.0-6.0	Apparent	Dec-May	---	---	Moderate	High------	Moderate.
GbA:												
Gilboa-----------	B	None---------	---	---	1.0-3.0	Apparent	Dec-May	---	---	Moderate	High------	Moderate.
Odell------------	B	None---------	---	---	1.0-3.0	Apparent	Jan-Apr	---	---	High------	High------	Moderate.
Gf----------------- Gilford	B/D	None---------	---	---	+.5-1.0	Apparent	Dec-May	---	---	High------	High------	Moderate.
GhB---------------- Glenhall	B	None---------	---	---	2.5-3.5	Apparent	Dec-May	---	---	High------	High------	Moderate.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Subsidence		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Initial	Total		Uncoated steel	Concrete
					Ft			In	In			
Gn, Gt------------ Granby	A/D	None--------	---	---	+1-1.0	Apparent	Nov-Jun	---	---	Moderate	High-----	Low.
Ho---------------- Houghton	A/D	None--------	---	---	+1-1.0	Apparent	Sep-Jun	1-4	55-60	High-----	High-----	Low.
Ir---------------- Iroquois	B/D	None--------	---	---	+.5-1.0	Apparent	Nov-May	---	---	High-----	High-----	Moderate.
Ke---------------- Kentland	A/D	None--------	---	---	+.5-1.0	Apparent	Nov-May	---	---	Moderate	High-----	Low.
MeA, MeB2:												
Martinsville-----	B	None--------	---	---	>6.0	---	---	---	---	Moderate	Moderate	Moderate.
Williamstown-----	C	None--------	---	---	1.5-3.5	Perched	Jan-Apr	---	---	High-----	Moderate	Low.
Mh, Mk------------ Maumee	A/D	None--------	---	---	+.5-1.0	Apparent	Dec-May	---	---	Moderate	High-----	Moderate.
MnC2, MnE--------- Miami	B	None--------	---	---	>6.0	---	---	---	---	Moderate	Moderate	Moderate.
Mp---------------- Montgomery	D	None--------	---	---	+1-1.0	Apparent	Dec-May	---	---	High-----	High-----	Low.
MrB2-------------- Montmorenci	B	None--------	---	---	2.5-4.0	Apparent	Nov-May	---	---	Moderate	High-----	Moderate.
MuA--------------- Morocco	B	None--------	---	---	1.0-2.0	Apparent	Jan-Apr	---	---	Moderate	Low------	High.
NsA, NsB---------- Nesius	A	None--------	---	---	2.5-4.0	Apparent	Nov-May	---	---	Low------	Low------	Moderate.
Nw---------------- Newton	A/D	None--------	---	---	+.5-1.0	Apparent	Dec-May	---	---	Moderate	High-----	High.
OaB, OaC---------- Oakville	A	None--------	---	---	>6.0	---	---	---	---	Low------	Low------	Moderate.
ObB--------------- Oakville	A	None--------	---	---	3.0-6.0	Apparent	Nov-Apr	---	---	Low------	Low------	Moderate.
OcC2-------------- Octagon	B	None--------	---	---	>6.0	---	---	---	---	Moderate	High-----	Moderate.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Subsidence: Initial	Subsidence: Total	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In	In			
OkB2:												
Octagon----------	B	None--------	---	---	>6.0	---	---	---	---	Moderate	High-----	Moderate.
Ayr--------------	B	None--------	---	---	>6.0	---	---	---	---	Moderate	Moderate	High.
OnA, OnB2--------- Onarga	B	None--------	---	---	2.5-6.0	Apparent	Nov-May	---	---	Moderate	Moderate	Moderate.
OpB2-------------- Onarga	B	None--------	---	---	3.0-6.0	Apparent	Nov-May	---	---	Moderate	Moderate	Moderate.
OrB--------------- Ormas	B	None--------	---	---	>6.0	---	---	---	---	Moderate	Low------	Moderate.
PaA, PaB---------- Papineau	C	None--------	---	---	1.0-3.0	Apparent	Feb-Jun	---	---	High-----	High-----	Low.
Pp---------------- Peotone	C/D	None--------	---	---	+2-1.0	Apparent	Nov-Jun	---	---	High-----	High-----	Moderate.
Pt. Pits												
Pu---------------- Prochaska	A/D	Rare--------	---	---	+.5-1.0	Apparent	Oct-Jun	---	---	Moderate	High-----	Moderate.
Px, Py------------ Prochaska	A/D	Frequent----	Long------	Nov-Jun	+.5-1.0	Apparent	Oct-Jun	---	---	Moderate	High-----	Moderate.
RtA--------------- Ridgeville	B	None--------	---	---	1.0-3.0	Apparent	Feb-May	---	---	High-----	Moderate	Moderate.
RuA--------------- Ridgeville	B	None--------	---	---	1.0-3.0	Apparent	Dec-Jun	---	---	Moderate	Moderate	Moderate.
Rv---------------- Ross	B	Frequent----	Very brief to long.	Nov-Jun	4.0-6.0	Apparent	Feb-Apr	---	---	Moderate	Low------	Low.
Sd---------------- Sawabash	B/D	Frequent----	Brief or long.	Nov-Jun	+.5-1.0	Apparent	Nov-Jun	---	---	High-----	High-----	Low.
SeA--------------- Seafield	B	None--------	---	---	1.0-2.0	Apparent	Jan-Apr	---	---	High-----	Moderate	High.
Sf---------------- Selma	B/D	None--------	---	---	+.5-2.0	Apparent	Dec-May	---	---	High-----	High-----	Low.
Sg---------------- Selma	B/D	None--------	---	---	+.5-2.0	Apparent	Mar-Jun	---	---	High-----	High-----	Low.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Subsidence		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Initial	Total		Uncoated steel	Concrete
					Ft			In	In			
Sh----------------- Selma	B/D	None---------	---	---	+.5-1.0	Apparent	Nov-May	---	---	High-----	High-----	Low.
Sk----------------- Selma	B/D	None---------	---	---	+.5-1.0	Apparent	Dec-May	---	---	High-----	High-----	Low.
SmB---------------- Simonin	B	None---------	---	---	2.5-4.0	Apparent	Nov-May	---	---	Moderate	Moderate	Moderate.
SrB---------------- Sparta	A	None---------	---	---	>6.0	---	---	---	---	Low------	Low------	Moderate.
SwA---------------- Strole	C	None---------	---	---	1.0-2.0	Apparent	Dec-May	---	---	High-----	High-----	Moderate.
SxA:												
Sumava------------	B	None---------	---	---	1.0-3.0	Apparent	Dec-May	---	---	Moderate	Moderate	Low.
Ridgeville--------	B	None---------	---	---	1.0-3.0	Apparent	Feb-May	---	---	High-----	Moderate	Moderate.
Odell-------------	B	None---------	---	---	1.0-3.0	Apparent	Dec-May	---	---	High-----	High-----	Moderate.
SyA---------------- Swygert	C	None---------	---	---	1.0-3.0	Perched	Feb-May	---	---	High-----	High-----	Low.
SzB2, SzC2:												
Swygert Variant--	D	None---------	---	---	2.0-3.5	Apparent	Nov-May	---	---	Moderate	High-----	Low.
Simonin-----------	B	None---------	---	---	2.5-4.0	Apparent	Nov-May	---	---	Moderate	Moderate	Moderate.
TaA---------------- Tedrow	B	None---------	---	---	1.0-2.0	Apparent	Jan-Apr	---	---	Moderate	Low------	Low.
To----------------- Toto	B/D	None---------	---	---	+1-1.0	Apparent	Oct-Jun	2-7	10-22	High-----	High-----	Moderate.
Ud----------------- Udorthents	B	None---------	---	---	>6.0	---	---	---	---	Moderate	High-----	Moderate.
Wa----------------- Wallkill	B/D	None---------	---	---	+.5-1.0	Apparent	Sep-Jun	---	---	High-----	Moderate	Moderate.
Wc----------------- Wallkill Variant	C/D	None---------	---	---	+1-1.0	Apparent	Feb-Jun	1-4	6-10	High-----	High-----	Moderate.
WeA---------------- Watseka	B	None---------	---	---	1.0-3.0	Apparent	Feb-May	---	---	Moderate	Low------	High.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Subsidence		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Initial	Total		Uncoated steel	Concrete
					Ft			In	In			
WkA---------------- Wesley	B	None---------	---	---	1.0-3.0	Perched	Feb-Jun	---	---	High-----	High-----	Low.
ZaA---------------- Zaborosky	B	None---------	---	---	1.0-2.0	Apparent	Dec-Apr	---	---	Low------	Low------	Moderate.
ZbB:												
Zaborosky---------	B	None---------	---	---	1.0-2.0	Apparent	Dec-Apr	---	---	Low------	Low------	Moderate.
Oakville----------	A	None---------	---	---	3.0-6.0	Apparent	Nov-Apr	---	---	Low------	Low------	Moderate.
Zg:												
Zadog------------	A/D	None---------	---	---	+1-1.0	Apparent	Nov-May	---	---	High-----	High-----	Moderate.
Granby-----------	A/D	None---------	---	---	+1-1.0	Apparent	Nov-Jun	---	---	Moderate	High-----	Low.

TABLE 19.--ENGINEERING INDEX TEST DATA

(Dashes indicate that data were not available. MAX means maximum dry density; OPT, optimum moisture; LL, liquid limit; PI, plasticity index; UN, Unified; and NP, nonplastic)

Soil name and location	Parent material	Report number S85-IN-111	Depth	Moisture density		Percentage passing sieve--				Percentage smaller than--				LL	PI	Classification	
				MAX	OPT	No. 4	No. 10	No. 40	No. 200	0.05 mm	0.02 mm	0.005 mm	0.002 mm			AASHTO	UN
			In	Lb/ cu ft	Pct									Pct			
Octagon loam:	Loamy glacial	14-1	0-10	109	15	99	99	95	53	---	---	---	9	NP	NP	A-4	ML
300 feet south	till.	14-2	10-18	113	16	98	98	96	74	---	---	---	22	30	12	A-6	CL
and 100 feet		14-3	18-34	112	17	98	98	95	72	---	---	---	26	32	15	A-6	CL
east of the		14-4	34-60	124	11	97	97	90	68	---	---	---	12	19	3	A-4	ML
northwest																	
corner of sec.																	
22, T. 29 N.,																	
R. 8 W.																	
Corwin loam:	Loamy glacial	15-1	0-10	103	18	99	99	97	57	---	---	---	9	NP	NP	A-4	ML
2,500 feet east	till.	15-2	10-19	113	15	97	97	92	62	---	---	---	14	27	9	A-4	CL
and 550 feet		15-3	19-32	109	17	97	97	95	73	---	---	---	24	36	17	A-6	CL
north of the		15-4	32-60	126	11	91	91	86	64	---	---	---	8	NP	NP	A-4	ML
southwest																	
corner of sec.																	
10, T. 29 N.,																	
R. 8 W.																	
Simonin sandy	Loamy outwash	16-1	0-10	120	11	99	99	95	31	---	---	---	5	NP	NP	A-2-4	SM
loam:	over clayey	16-4	24-31	124	10	99	99	96	35	---	---	---	4	NP	NP	A-2-4	SM
1,000 feet	lacustrine	16-5	31-38	108	19	95	95	94	92	---	---	---	43	39	18	A-6	CL
north and 250	material.	16-6	38-60	103	21	100	100	99	96	---	---	---	53	50	24	A-7-6	CL
feet west of																	
the southeast																	
corner of sec.																	
29, T. 29 N.,																	
R. 8 W.																	
Oakville sand:	Eolian sand---	19-1	0-4	109	12	100	100	99	11	---	---	---	11	NP	NP	A-2-4	SM
1,400 feet		19-2	4-39	107	14	100	100	100	7	---	---	---	7	NP	NP	A-3	SP-SM
south and 100		19-3	39-60	115	13	100	100	100	6	---	---	---	6	NP	NP	A-3	SP-SM
feet west of																	
the northeast																	
corner of sec.																	
25, T. 30 N.,																	
R. 10 W.																	

TABLE 20.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Ackerman	Sandy, mixed, mesic Histic Humaquepts
Adrian	Sandy or sandy-skeletal, mixed, euic, mesic Terric Medisaprists
Adrian Variant	Sandy, mixed, mesic Histic Humaquepts
Algansee	Mixed, mesic Aquic Udipsamments
Aquolls	Sandy, mixed, mesic Typic Haplaquolls
Aubbeenaubbee	Fine-loamy, mixed, mesic Aeric Ochraqualfs
Ayr	Sandy over loamy, mixed, mesic Typic Argiudolls
Ayrmount	Sandy over loamy, mixed, mesic Typic Argiudolls
Barce	Fine-loamy, mixed, mesic Typic Argiudolls
Barry	Fine-loamy, mixed, mesic Typic Argiaquolls
Brems	Mixed, mesic Aquic Udipsamments
Bryce	Fine, mixed, mesic Typic Haplaquolls
Comfrey	Fine-loamy, mixed, mesic Cumulic Haplaquolls
Conrad	Mixed, mesic Typic Psammaquents
Corwin	Fine-loamy, mixed, mesic Typic Argiudolls
*Craigmile	Coarse-loamy over sandy or sandy-skeletal, mixed, mesic Fluvaquentic Haplaquolls
Darroch	Fine-loamy, mixed, mesic Aquic Argiudolls
Elston Variant	Coarse-loamy,mixed,mesic Typic Argiudolls
Foresman	Fine-loamy, mixed, mesic Typic Argiudolls
Gilboa	Fine-loamy, mixed, mesic Aquic Argiudolls
Gilford	Coarse-loamy, mixed, mesic Typic Haplaquolls
Glenhall	Fine-loamy, mixed, mesic Mollic Hapludalfs
Granby	Sandy, mixed, mesic Typic Haplaquolls
Houghton	Euic, mesic Typic Medisaprists
Iroquois	Fine-loamy over clayey, mixed, mesic Typic Argiaquolls
Kentland	Sandy, mixed, mesic Typic Haplaquolls
Martinsville	Fine-loamy, mixed, mesic Typic Hapludalfs
Martisco Variant	Coarse-silty, mixed (calcareous), mesic Typic Humaquepts
Maumee	Sandy, mixed, mesic Typic Haplaquolls
Miami	Fine-loamy, mixed, mesic Typic Hapludalfs
Montgomery	Fine, mixed, mesic Typic Haplaquolls
*Montmorenci	Fine-loamy, mixed, mesic Aquollic Hapludalfs
Morocco	Mixed, mesic Aquic Udipsamments
Nesius	Sandy, mixed, mesic Entic Hapludolls
*Newton	Sandy, mixed, mesic Typic Humaquepts
Oakville	Mixed, mesic Typic Udipsamments
Octagon	Fine-loamy, mixed, mesic Mollic Hapludalfs
Odell	Fine-loamy, mixed, mesic Aquic Argiudolls
Onarga	Coarse-loamy, mixed, mesic Typic Argiudolls
Ormas	Loamy, mixed, mesic Arenic Hapludalfs
Papineau	Fine-loamy over clayey, mixed, mesic Aquic Argiudolls
Peotone	Fine, montmorillonitic, mesic Cumulic Haplaquolls
Prochaska	Sandy, mixed, mesic Fluvaquentic Haplaquolls
Ridgeville	Coarse-loamy, mixed, mesic Aquic Argiudolls
Ross	Fine-loamy, mixed, mesic Cumulic Hapludolls
Sawabash	Fine-silty, mixed (calcareous), mesic Cumulic Haplaquolls
Seafield	Coarse-loamy, mixed, mesic Udollic Ochraqualfs
Selma	Fine-loamy, mixed, mesic Typic Haplaquolls
Simonin	Coarse-loamy over clayey, mixed, mesic Typic Argiudolls
Sparta	Sandy, mixed, mesic Entic Hapludolls
Strole	Fine, illitic, mesic Aquic Argiudolls
Sumava	Coarse-loamy, mixed, mesic Aquic Argiudolls
Swygert	Fine, mixed, mesic Aquic Argiudolls
Swygert Variant	Fine, mixed, mesic Mollic Hapludalfs
Tedrow	Mixed, mesic Aquic Udipsamments
Toto	Coprogenous, euic, mesic Limnic Medisaprists
Udorthents	Loamy, mixed, mesic Udorthents
Wallkill	Fine-loamy, mixed, nonacid, mesic Thapto-Histic Fluvaquents
Wallkill Variant	Fine, mixed, mesic Thapto-Histic Fluvaquents
Watseka	Sandy, mixed, mesic Aquic Hapludolls

TABLE 20.--CLASSIFICATION OF THE SOILS--Continued

Soil name	Family or higher taxonomic class
Wesley	Coarse-loamy, mixed, mesic Aquic Hapludolls
Whitaker	Fine-loamy, mixed, mesic Aeric Ochraqualfs
Williamstown	Fine-loamy, mixed, mesic Aquic Hapludalfs
Zaborosky	Mixed, mesic Aquic Udipsamments
Zadog	Coarse-loamy, mixed, mesic Typic Haplaquolls

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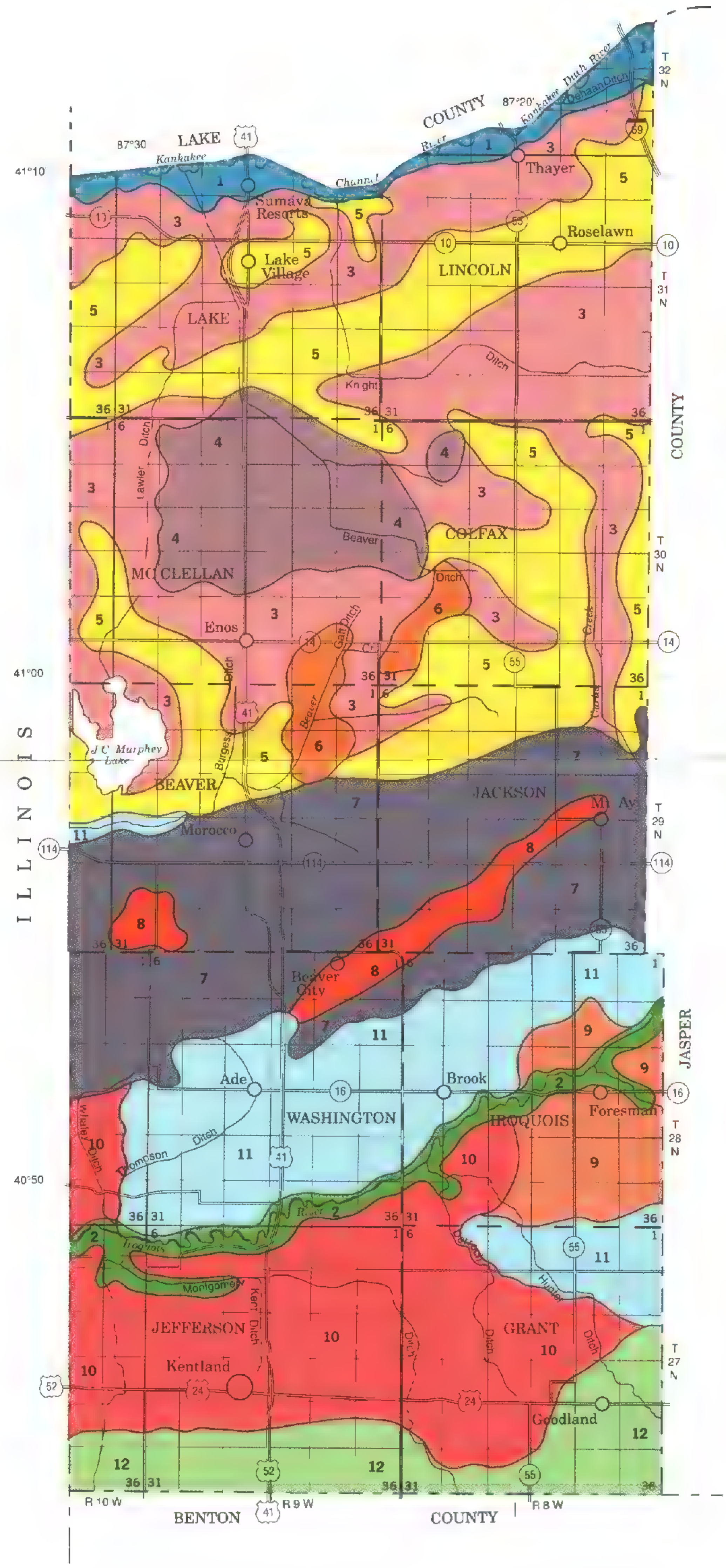

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

SECTIONALIZED TOWNSHIP

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

SOIL LEGEND*

DOMINANTLY NEARLY LEVEL, VERY POORLY DRAINED SOILS; ON FLOOD PLAINS

1 Craigmile-Prochaska association

2 Sawabash Comfrey association

DOMINANTLY NEARLY LEVEL OR GENTLY SLOPING, VERY POORLY DRAINED OR SOMEWHAT POORLY DRAINED SOILS; ON UPLANDS

3 Granby Maumee-Zadog association

4 Conrad-Zaborosky-Kent and association

DOMINANTLY STRONGLY SLOPING TO NEARLY LEVEL, WELL DRAINED TO SOMEWHAT POORLY DRAINED SOILS, ON UPLANDS

5 Oakville-Morocco-Brems association

DOMINANTLY NEARLY LEVEL, VERY POORLY DRAINED SOILS; ON UPLANDS

6 Toto-Ackerman-Adrian association

DOMINANTLY NEARLY LEVEL TO MODERATELY SLOPING, POORLY DRAINED TO WELL DRAINED SOILS; ON UPLANDS

7 Barry-Sumava-Octagon association

DOMINANTLY NEARLY LEVEL TO STRONGLY SLOPING VERY POORLY DRAINED TO MODERATELY WELL DRAINED SOILS; ON UPLANDS

8 Swygert-Bryce-Swygert Variant association

9 Montgomery Strole-Simonin association

10 Selma, till substratum-Darroch, till substratum-Foresman, till substratum association

11 Selma-Darroch-Foresman association

12 Selma, till substratum Barce-Gilboa association

* The units on this legend are described in the text under the heading "General Soil Map Units."

Compiled 1996

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
PURDUE UNIVERSITY
AGRICULTURAL EXPERIMENT STATION
INDIANA DEPARTMENT OF NATURAL RESOURCES
STATE SOIL CONSERVATION BOARD
DIVISION OF SOIL CONSERVATION

GENERAL SOIL MAP

NEWTON COUNTY, INDIANA

Scale 1:190,080

1 0 1 2 3 Mi

1 0 3 6 Km

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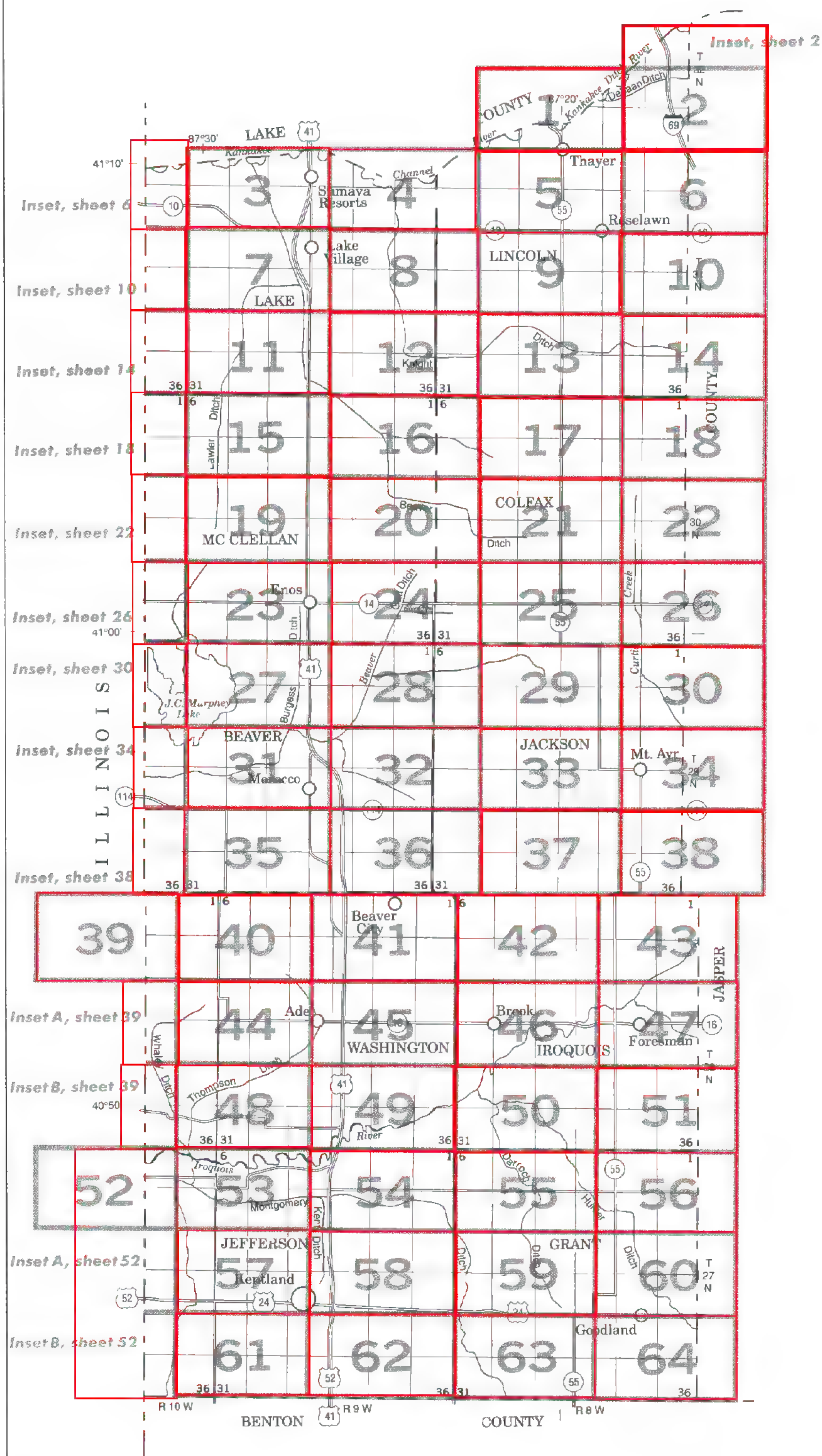


SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

N

INDEX TO MAP SHEETS

NEWTON COUNTY, INDIANA

Scale 1:190,080

1 0 1 2 3 M

1 0 3 6 Km

SOIL LEGEND

Map symbols consist of a combination of letters or of letters and numbers. The first capital letter is the initial letter of the map unit name. The lowercase letter that follows separates map units having names that begin with the same letter, except that it does not separate sloping or eroded phases. The second capital letter indicates the class of slope. Symbols without a slope letter are for nearly level soils or miscellaneous areas. A final number of 2 indicates that the soil is moderately eroded, and a final number of 3 indicates that the soil is severely eroded.

SYMBOL	NAME
Ac	Ackerman-Martisco Variant complex, drained
Ad	Adrian muck, drained
Af	Adrian Variant muck, drained
Ap	Algansee loamy sand, frequently flooded, undrained
Ar	Aquolls, ponded
AuA	Aubbeenaubbee-Whitaker complex, 0 to 2 percent slopes
AyB	Ayr loamy fine sand, 1 to 4 percent slopes
AzA	Ayrmount loamy fine sand, 0 to 2 percent slopes
BbA	Barce-Corwin complex, 0 to 2 percent slopes
BfB2	Barce-Montmorenci complex, 1 to 4 percent slopes, eroded
Bh	Barry-Gilford complex
BmB	Brems loamy sand, 1 to 3 percent slopes
By	Bryce silty clay loam
Co	Comfrey loam, frequently flooded, undrained
Cr	Conrad loamy fine sand
CtA	Corwin fine sandy loam, 0 to 2 percent slopes
CtB2	Corwin fine sandy loam, 2 to 6 percent slopes, eroded
Cv	Craigmile sandy loam, frequently flooded
Cz	Craigmile mucky silt loam, frequently flooded, undrained
DaA	Darroch fine sandy loam, 0 to 2 percent slopes
DcA	Darroch silt loam, 0 to 2 percent slopes
DdA	Darroch fine sandy loam, sandy substratum, 0 to 2 percent slopes
DgA	Darroch loam, till substratum, 0 to 2 percent slopes
EsB	Elston Variant fine sandy loam, 1 to 3 percent slopes
FeA	Foresman fine sandy loam, 0 to 2 percent slopes
FoA	Foresman silt loam, 0 to 2 percent slopes
FoB2	Foresman silt loam, 2 to 6 percent slopes, eroded
FrA	Foresman fine sandy loam, till substratum, 0 to 2 percent slopes
FrB2	Foresman fine sandy loam, till substratum, 2 to 6 percent slopes, eroded
FtA	Foresman silt loam, till substratum, 0 to 2 percent slopes
FtB2	Foresman silt loam, till substratum, 2 to 6 percent slopes, eroded
FwA	Foresman silt loam, moderately fine substratum, 0 to 2 percent slopes
GbA	Gilboa-Odell complex, 0 to 2 percent slopes
Gf	Gilford fine sandy loam
GhB	Glenhall loam, 1 to 4 percent slopes
Gn	Granby mucky loamy fine sand
Gt	Granby loamy fine sand
Ho	Houghton muck, drained
Ir	Iroquois fine sandy loam
Ke	Kentland mucky fine sand
MeA	Martinsville-Williamstown complex, 0 to 2 percent slopes
MeB2	Martinsville-Williamstown complex, 2 to 6 percent slopes, eroded
Mh	Maumee loamy fine sand
Mk	Maumee mucky loamy fine sand
MnC2	Miami loam, 6 to 12 percent slopes, eroded
MnE	Miami loam, 15 to 25 percent slopes
Mp	Montgomery silty clay loam
MrB2	Montmorenci fine sandy loam, 2 to 6 percent slopes, eroded
MuA	Morocco loamy sand
NsA	Nesius loamy fine sand, 0 to 1 percent slopes
NsB	Nesius loamy fine sand, 1 to 4 percent slopes
Nw	Newton loamy fine sand, undrained
OaB	Oakville fine sand, 2 to 6 percent slopes
OaC	Oakville fine sand, 6 to 15 percent slopes
ObB	Oakville fine sand, moderately wet, 1 to 3 percent slopes
OcC2	Octagon loam, 6 to 12 percent slopes, eroded
OkB2	Octagon-Ayr complex, 2 to 6 percent slopes, eroded
OnA	Onarga fine sandy loam, moderately wet, 0 to 2 percent slopes
OnB2	Onarga fine sandy loam, moderately wet, 2 to 6 percent slopes, eroded
OpB2	Onarga fine sandy loam, till substratum, 2 to 6 percent slopes, eroded
OrB	Ormas loamy sand, sandy substratum, 1 to 4 percent slopes
PaA	Papineau fine sandy loam, 0 to 1 percent slopes
PaB	Papineau fine sandy loam, 1 to 3 percent slopes
Pp	Peotone silty clay loam, pothole
Pt	Pits, quarry
Pu	Prochaska loamy sand, rarely flooded
Px	Prochaska loamy sand, frequently flooded
Py	Prochaska loamy sand, frequently flooded, undrained
RtA	Ridgeville fine sandy loam, 0 to 2 percent slopes
RuA	Ridgeville fine sandy loam, till substratum, 0 to 2 percent slopes
Rv	Ross silt loam, frequently flooded
Sd	Sawabash silty clay loam, frequently flooded, undrained
SeA	Seafield fine sandy loam, 0 to 2 percent slopes
Sf	Selma fine sandy loam
Sg	Selma silt loam
Sh	Selma loam, sandy substratum
Sk	Selma silty clay loam, till substratum
SmB	Simonin loamy sand, 1 to 3 percent slopes
SrB	Sparta loamy fine sand, 1 to 4 percent slopes
SwA	Strole silty clay loam, 0 to 1 percent slopes
SxA	Sumava-Ridgeville-Odell complex, 0 to 2 percent slopes
SyA	Swygert silt loam, 0 to 2 percent slopes
SzB2	Swygert Variant-Simonin complex, 2 to 6 percent slopes, eroded
SzC2	Swygert Variant-Simonin complex, 6 to 15 percent slopes, eroded
TaA	Tedrow loamy fine sand, 0 to 2 percent slopes
To	Toto muck, drained
Ud	Udorthents, loamy
Wa	Wallkill loam, pothole
Wc	Wallkill Variant mucky silty clay
WeA	Watseka loamy sand, 0 to 1 percent slopes
WkA	Wesley fine sandy loam, 0 to 1 percent slopes
ZaA	Zaborosky fine sand, 0 to 2 percent slopes
ZbB	Zaborosky-Oakville, moderately wet, complex, 2 to 9 percent slopes, hummocky
Zg	Zadog-Granby complex

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate — 56
- Federal — 287
- State — 52
- County, farm or ranch — 1283

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or Small (Named where applicable)

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban area) (occupied)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — Gas
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial
- Intermittent

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

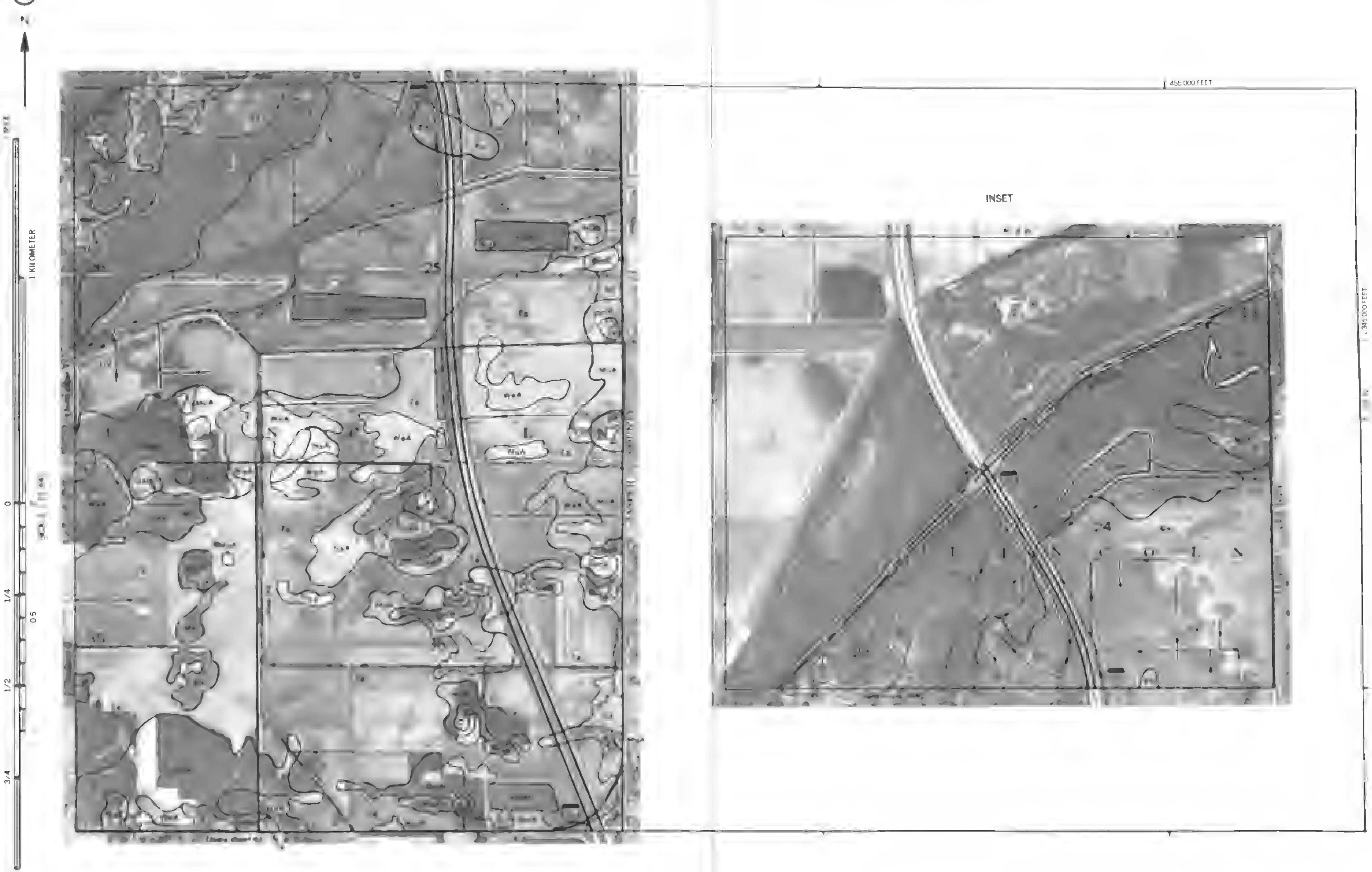
SPECIAL SYMBOLS FOR SOIL SURVEY

- SOIL DELINEATIONS AND SYMBOLS — Ac MuA
- ESCARPMENTS
  - Bedrock (points down slope)
  - Other than bedrock (points down slope)
- SHORT STEEP SLOPE
- GULLY
- DEPRESSION OR SINK
- SOIL SAMPLE (normally not shown)
- MISCELLANEOUS
  - Blowout
  - Clay spot
  - Gravelly spot
  - Gumbo, slick or scabby spot (sodic)
  - Dumps and other similar non soil areas
  - Prominent hill or peak
  - Rock outcrop (includes sandstone and shale)
  - Saline spot
  - Sandy spot
  - Severely eroded spot
  - Slide or slip (tips point upslope)
  - Stony spot, very stony spot
  - Area (3 5 acres) used as a landfill
  - Very poorly drained soils in potholes
  - 20" to 40" to bedrock
  - Very severely eroded spot

1

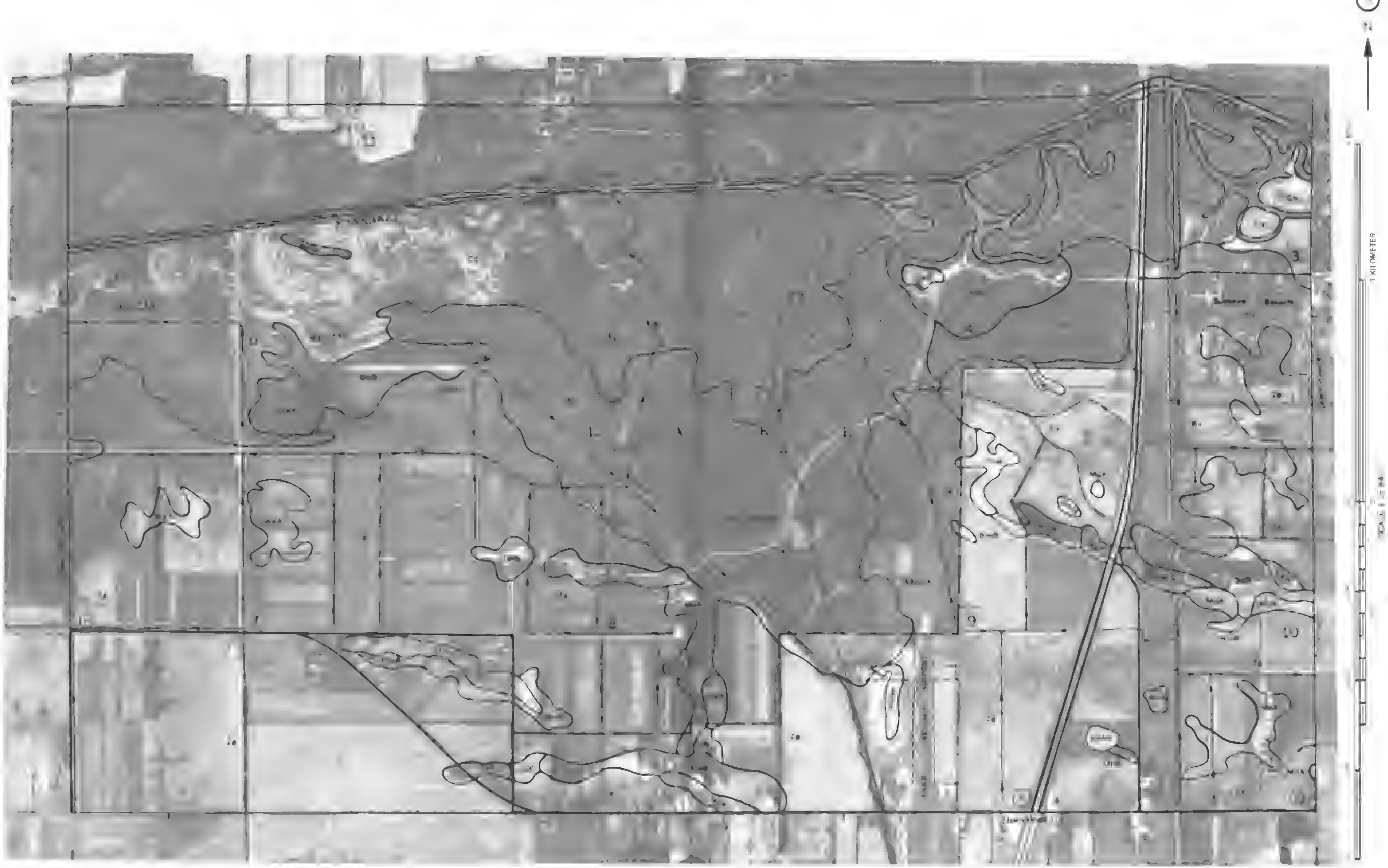
NEWTON COUNTY, INDIANA NO. 1

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

NEWTON COUNTY, INDIANA NO. 2



NEWTON COUNTY, INDIANA NO. 3

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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NEWTON COUNTY, INDIANA NO. 4

SOIL SURVEY OF NEWTON COUNTY, INDIANA — SHEET NUMBER 5

NEWTON COUNTY, INDIANA NO. 5

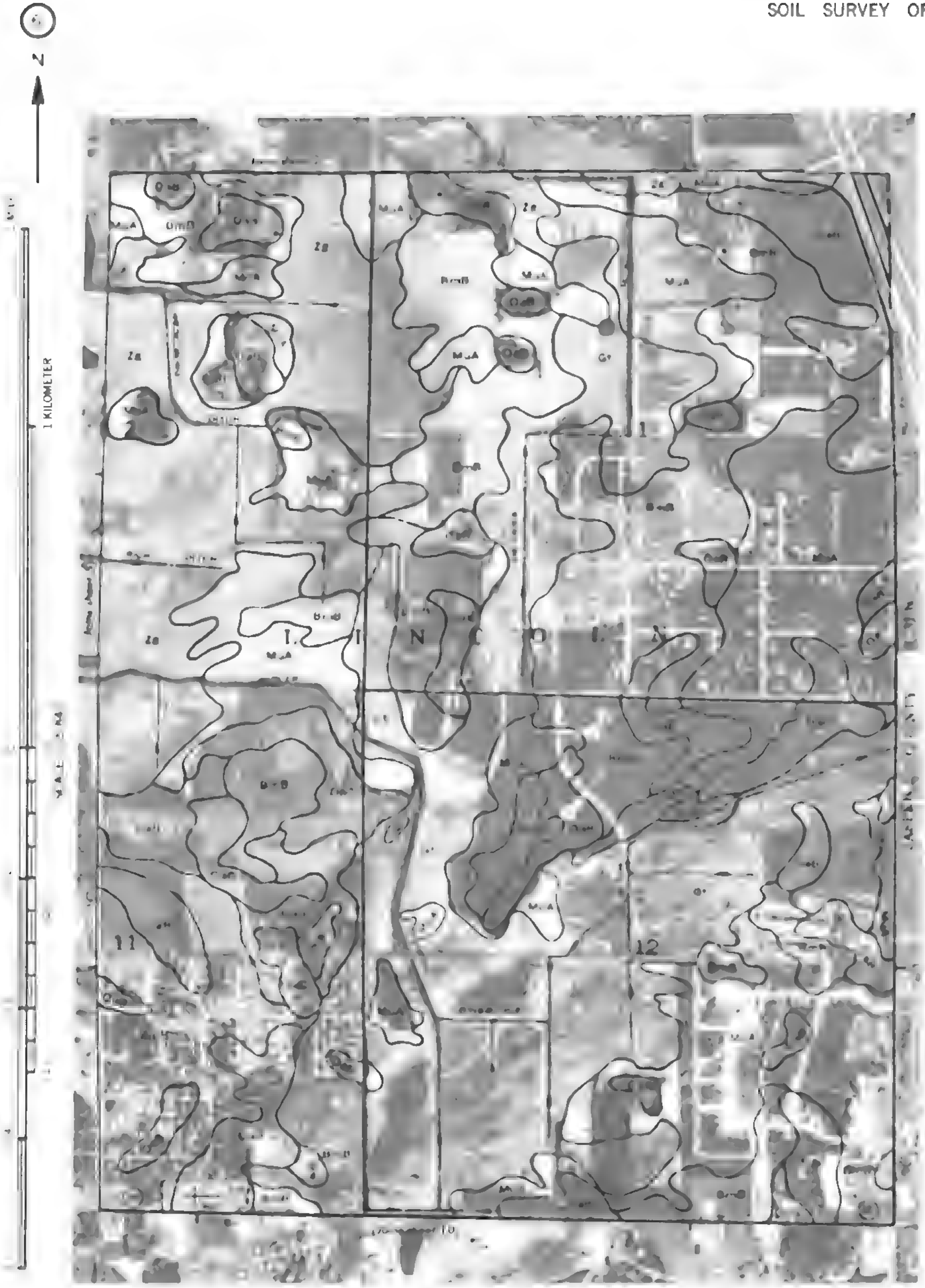
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

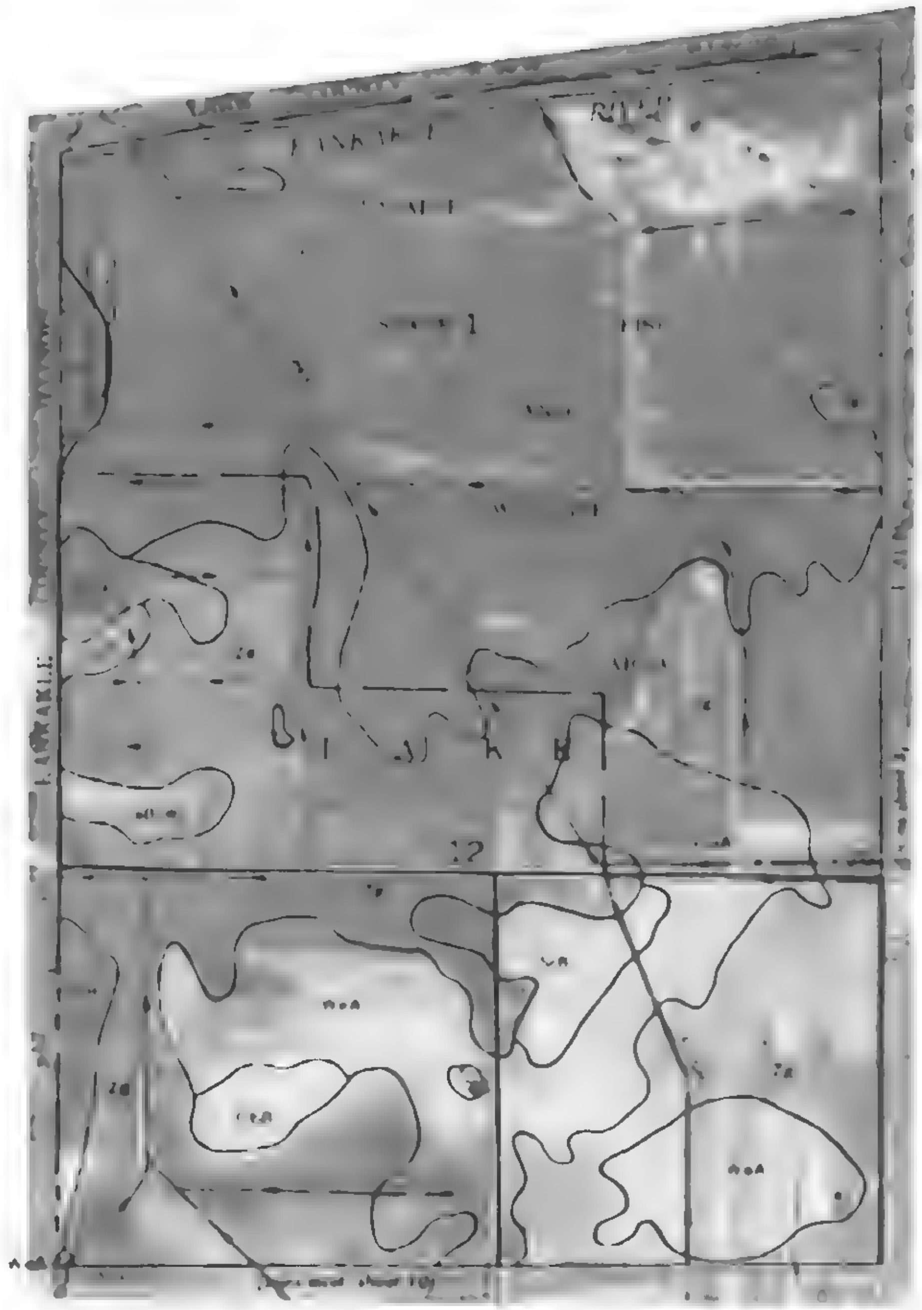
SCALE 1:15 840

0 1/4 1/2 1 MILE

0 0.5 1 KILOMETER



INSET



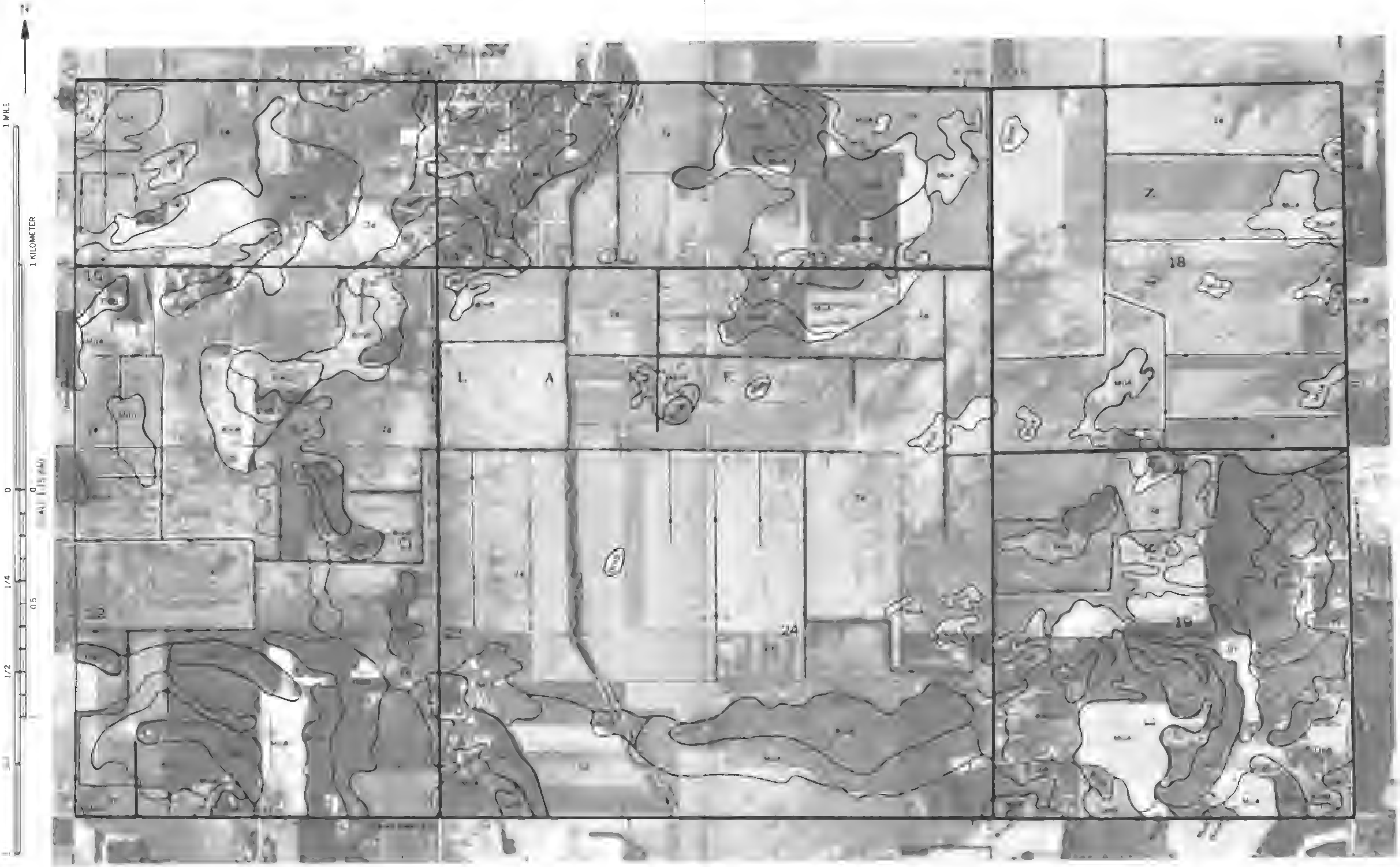
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown are approximately positioned.

N

1 KILOMETER
0.5
0
SCALE 1:15 840

NEWTON COUNTY, INDIANA NO. 7

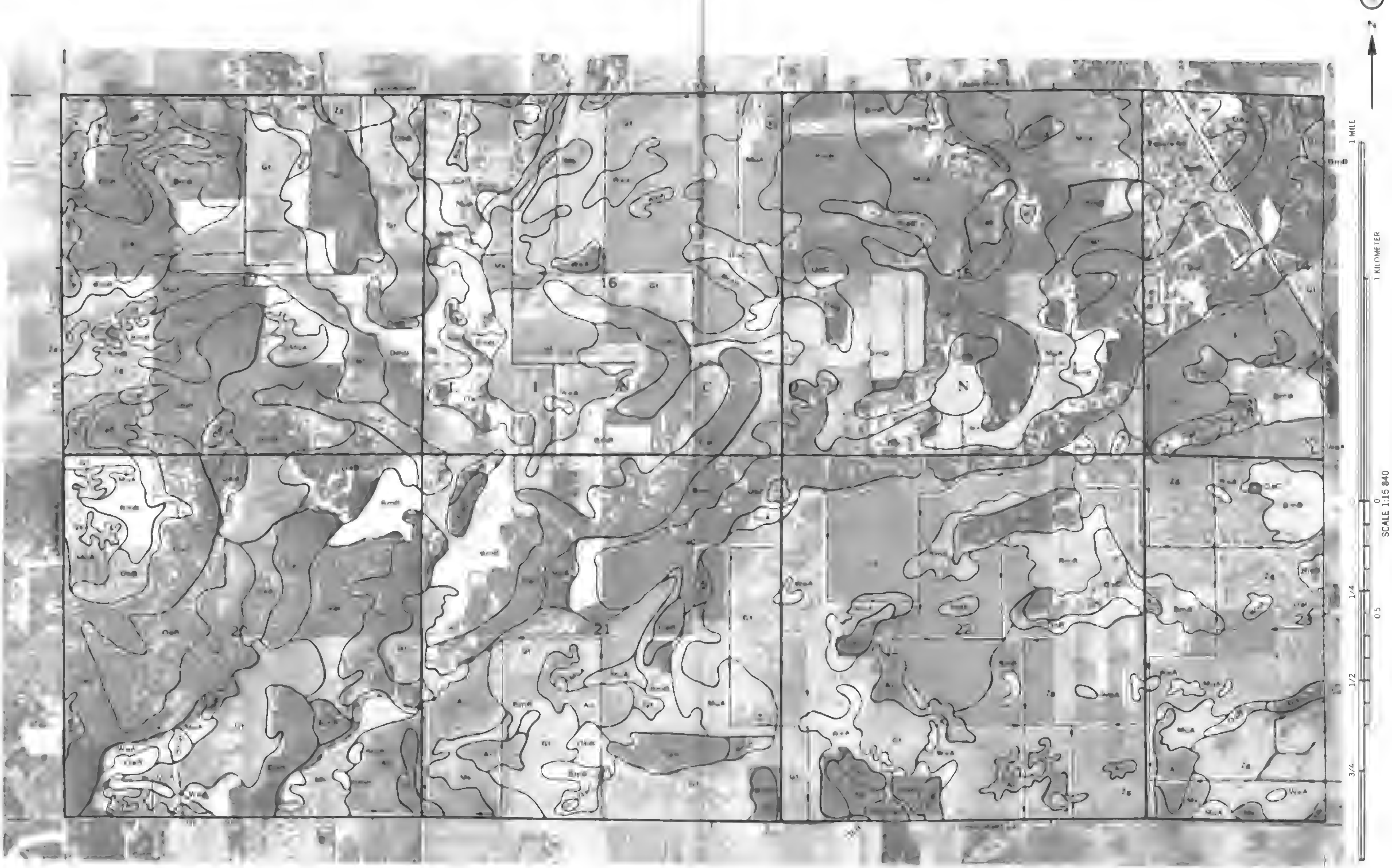
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1962 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

NEWTON COUNTY, INDIANA NO. 8

SOIL SURVEY OF NEWTON COUNTY, INDIANA — SHEET NUMBER 9



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF NEWTON COUNTY, INDIANA — SHEET NUMBER 10

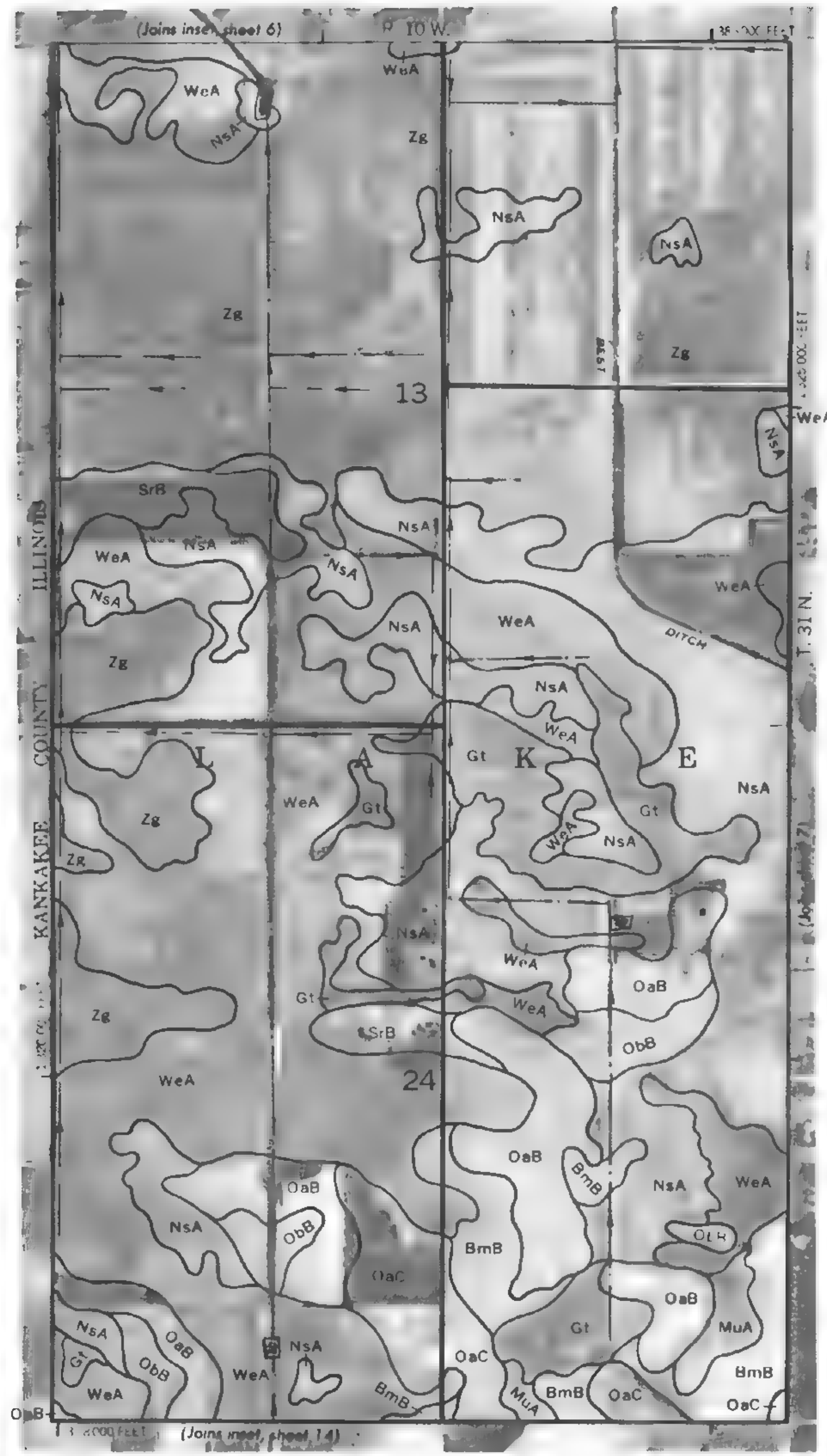
N

1 MILE 0 1/4 1/2 3/4 1

1 KILOMETER 0 0.5 1

SCALE 1:15 840

INSET

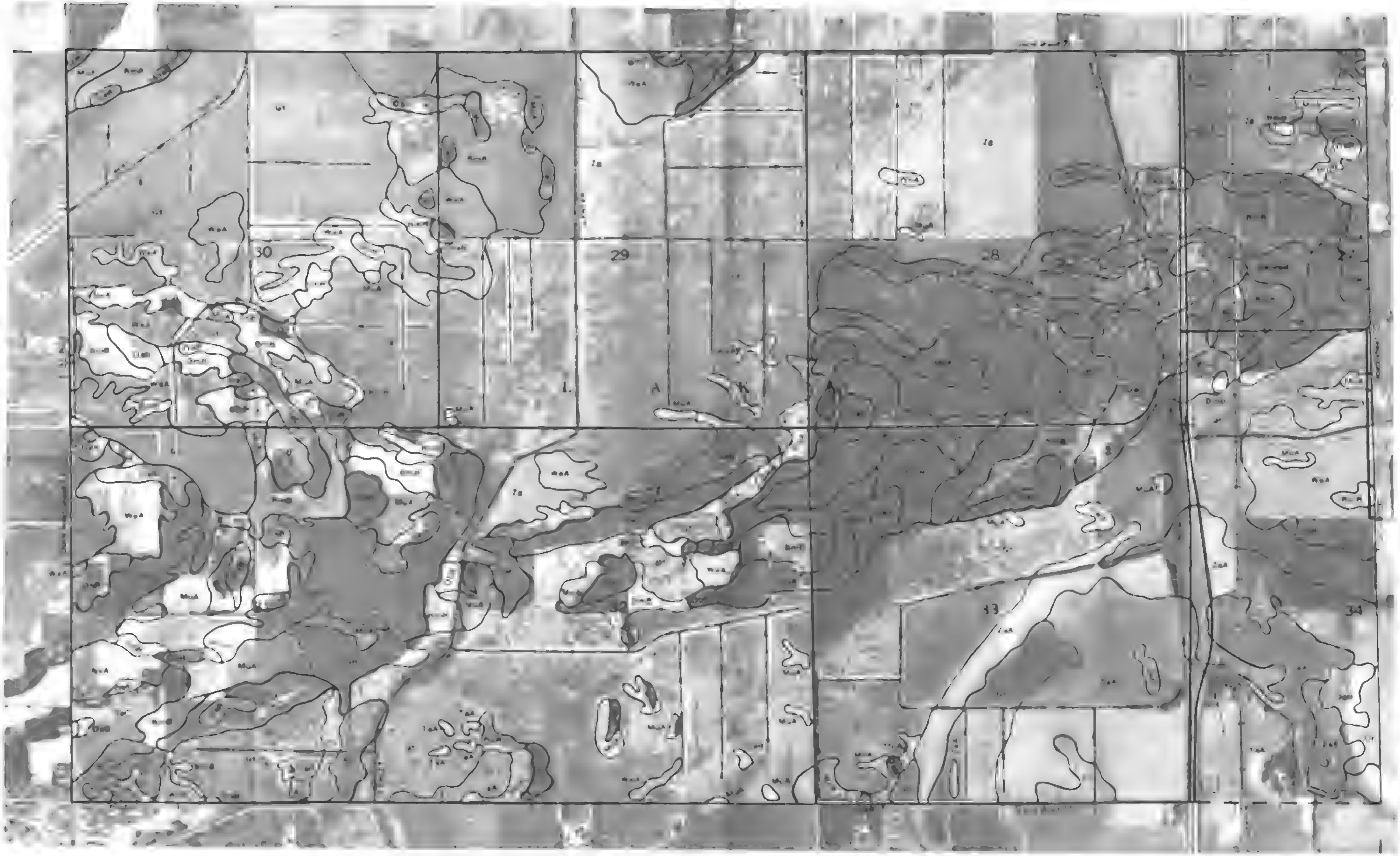


This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

NEWTON COUNTY, INDIANA NO. 10

11

N



1 KILOMETER

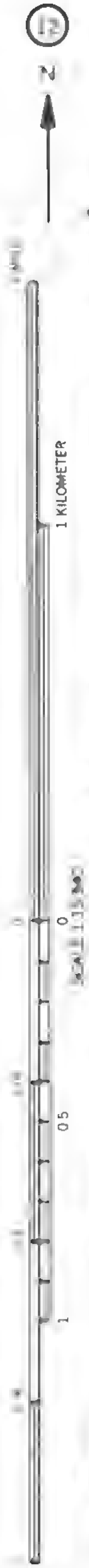
0

SCALE 1:15 840

This soil survey map was compiled by the U S Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned

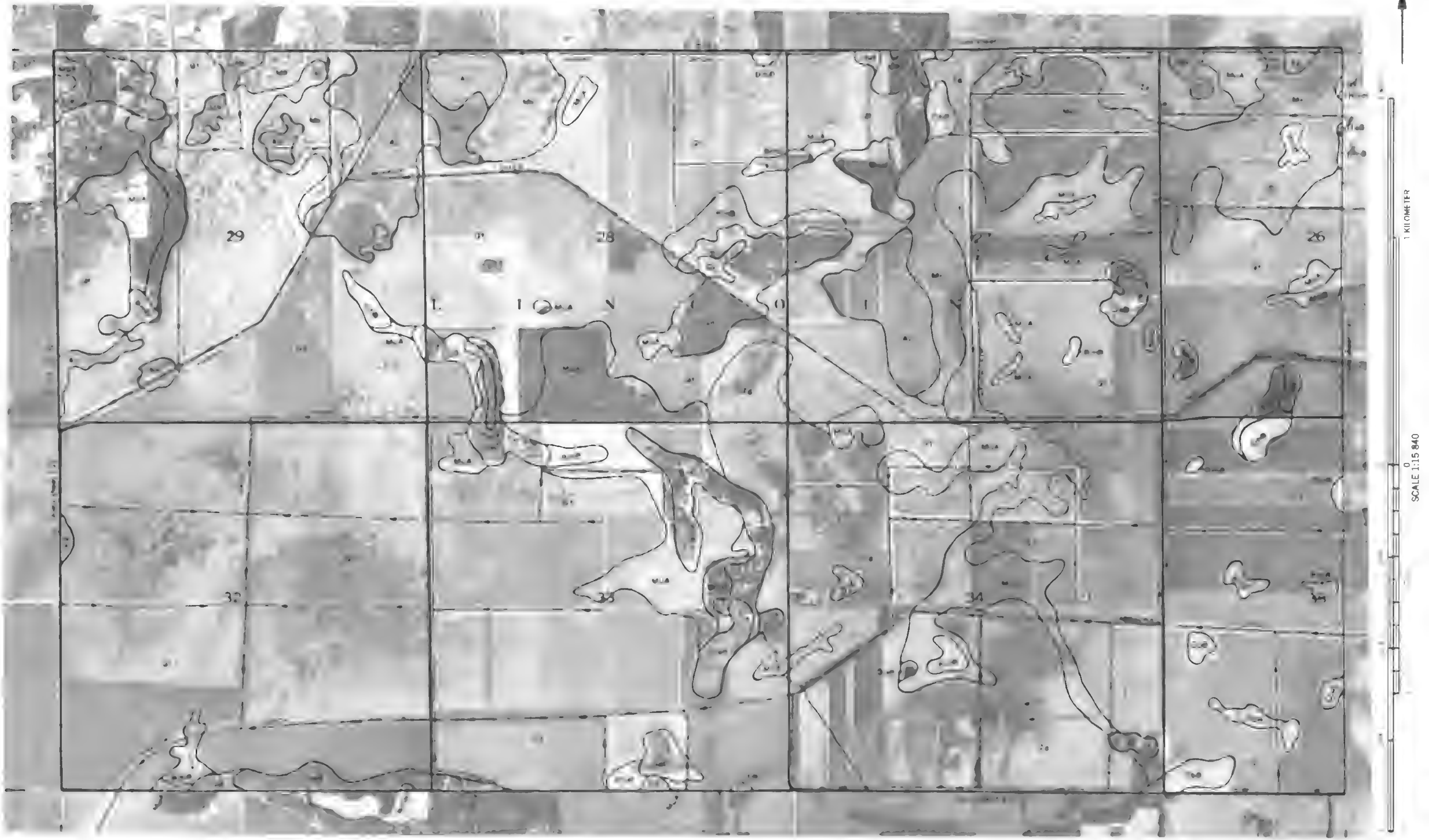
SOIL SURVEY OF NEWTON COUNTY, INDIANA — SHEET NUMBER 12

12



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

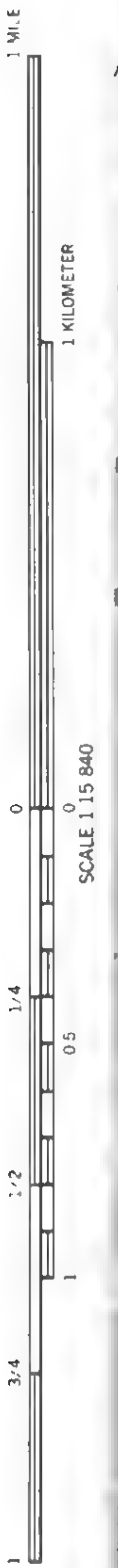
NEWTON COUNTY, INDIANA NO. 12

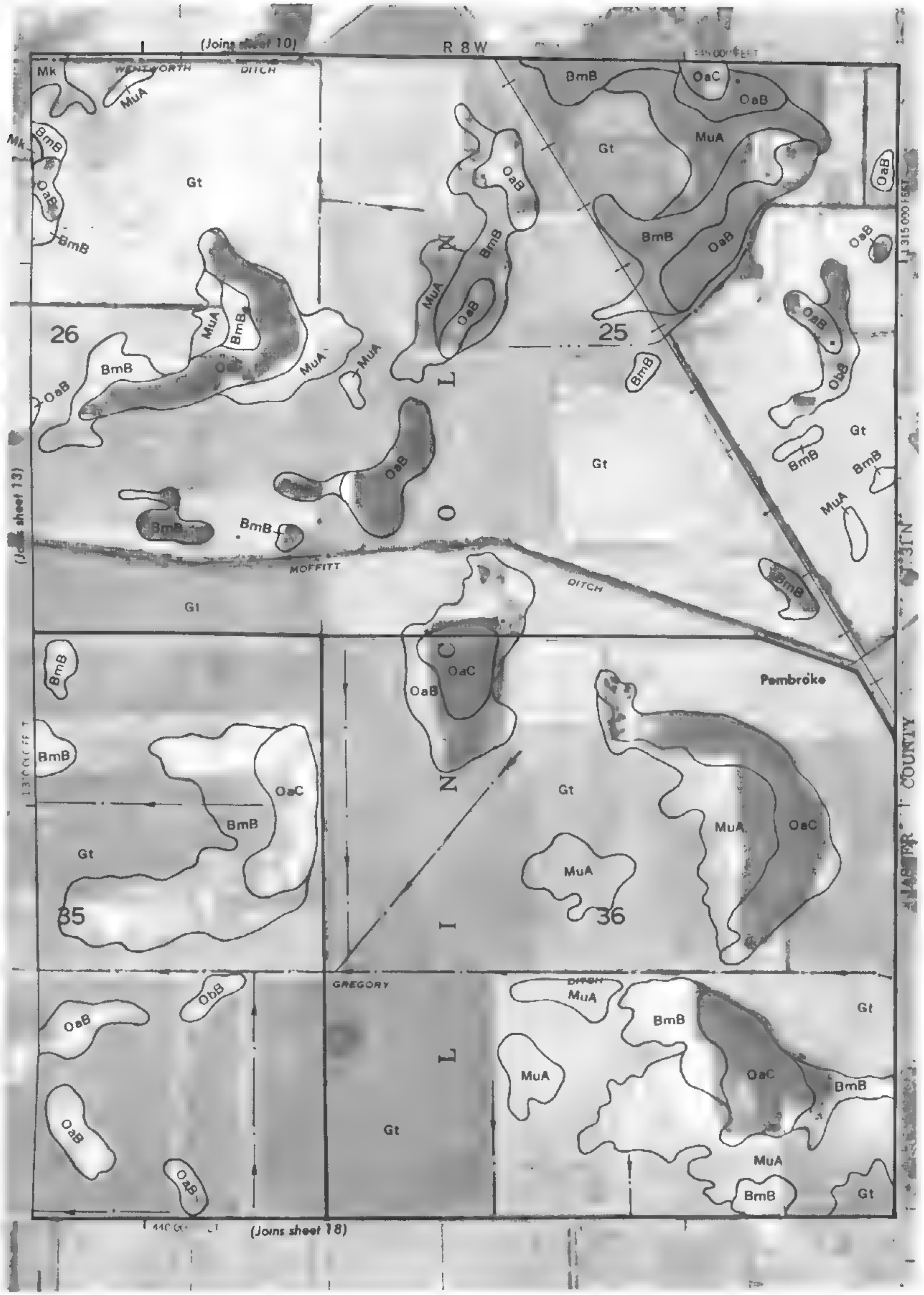


NEWTON COUNTY, INDIANA NO. 13

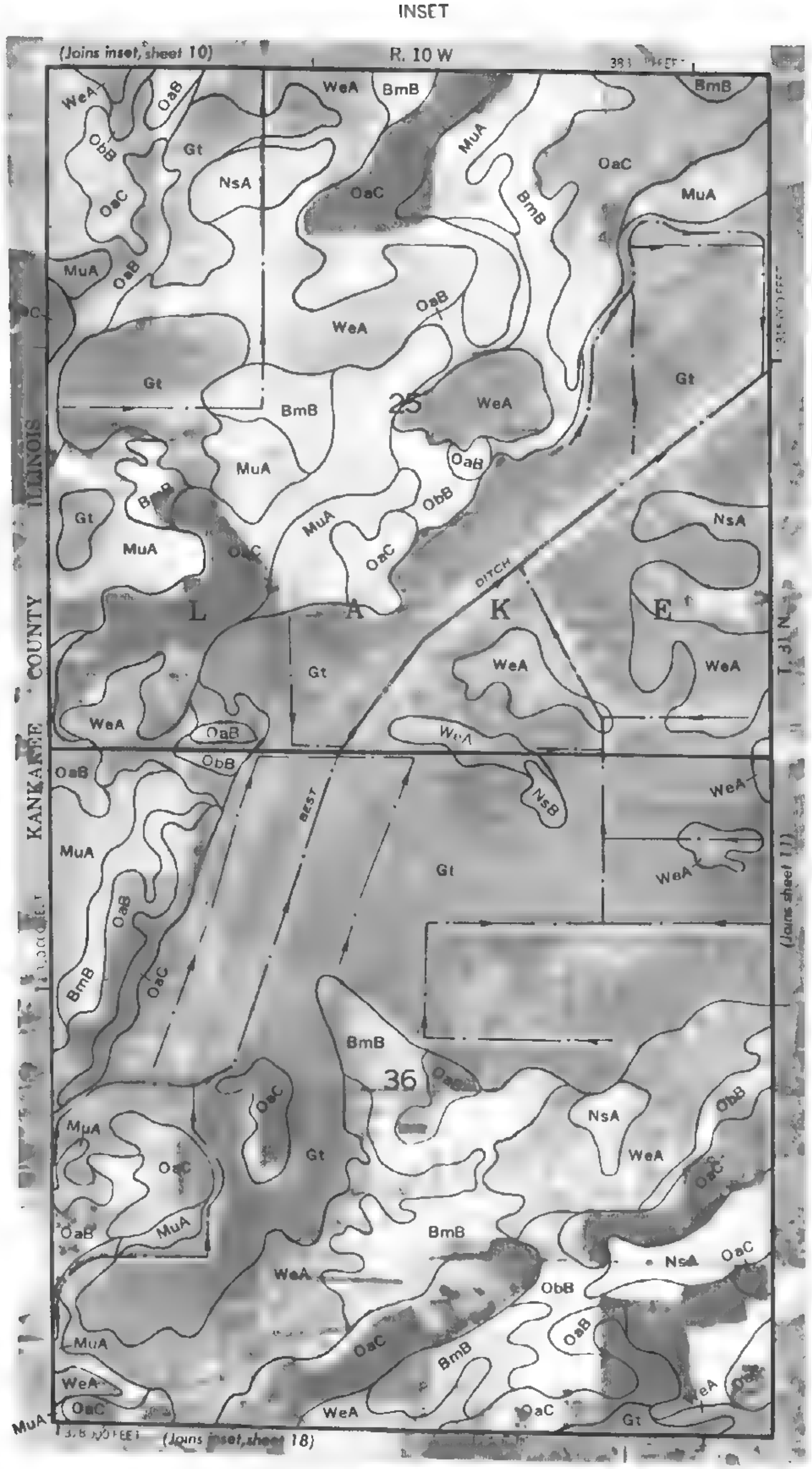
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF NEWTON COUNTY, INDIANA — SHEET NUMBER 14





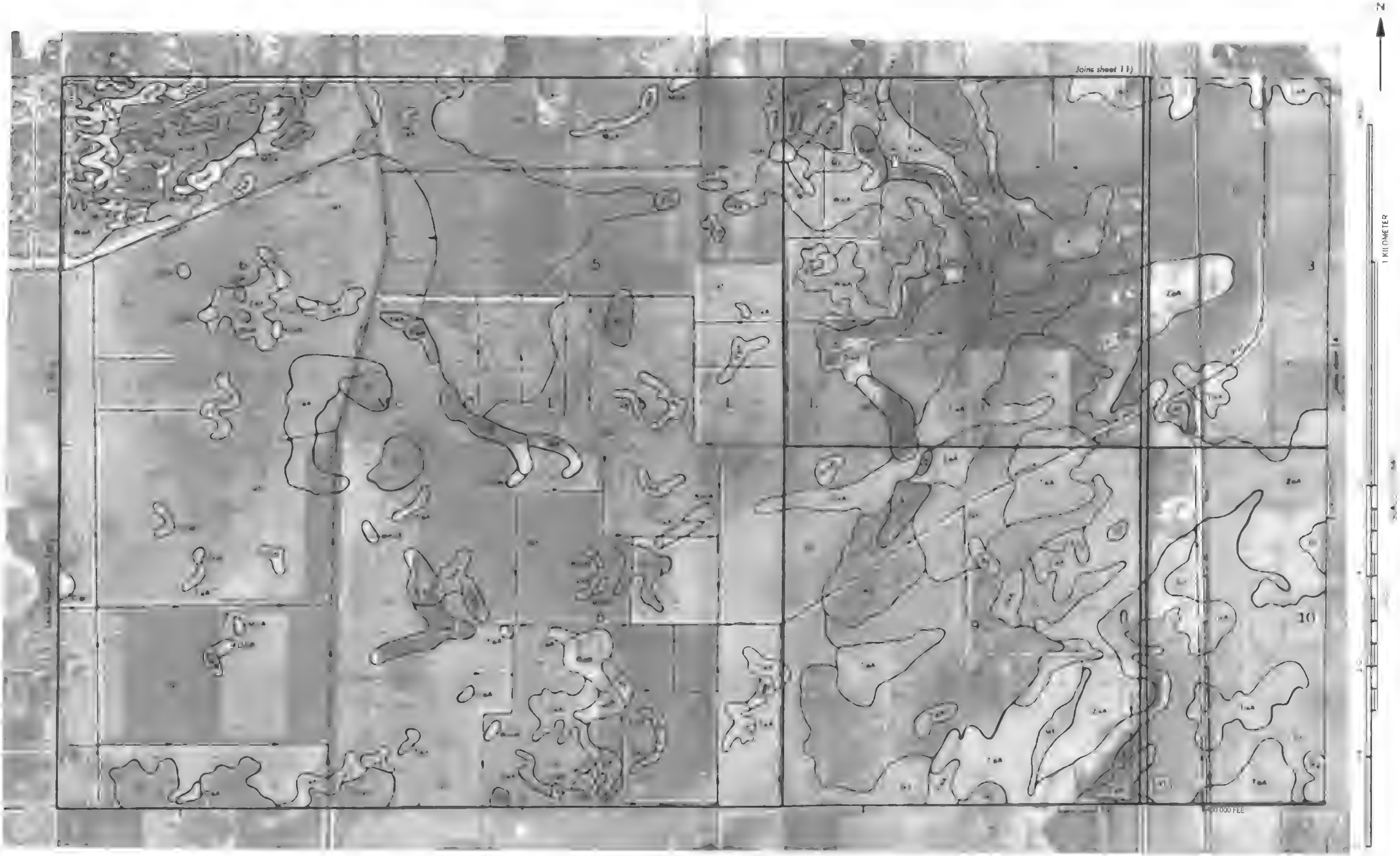
INSET



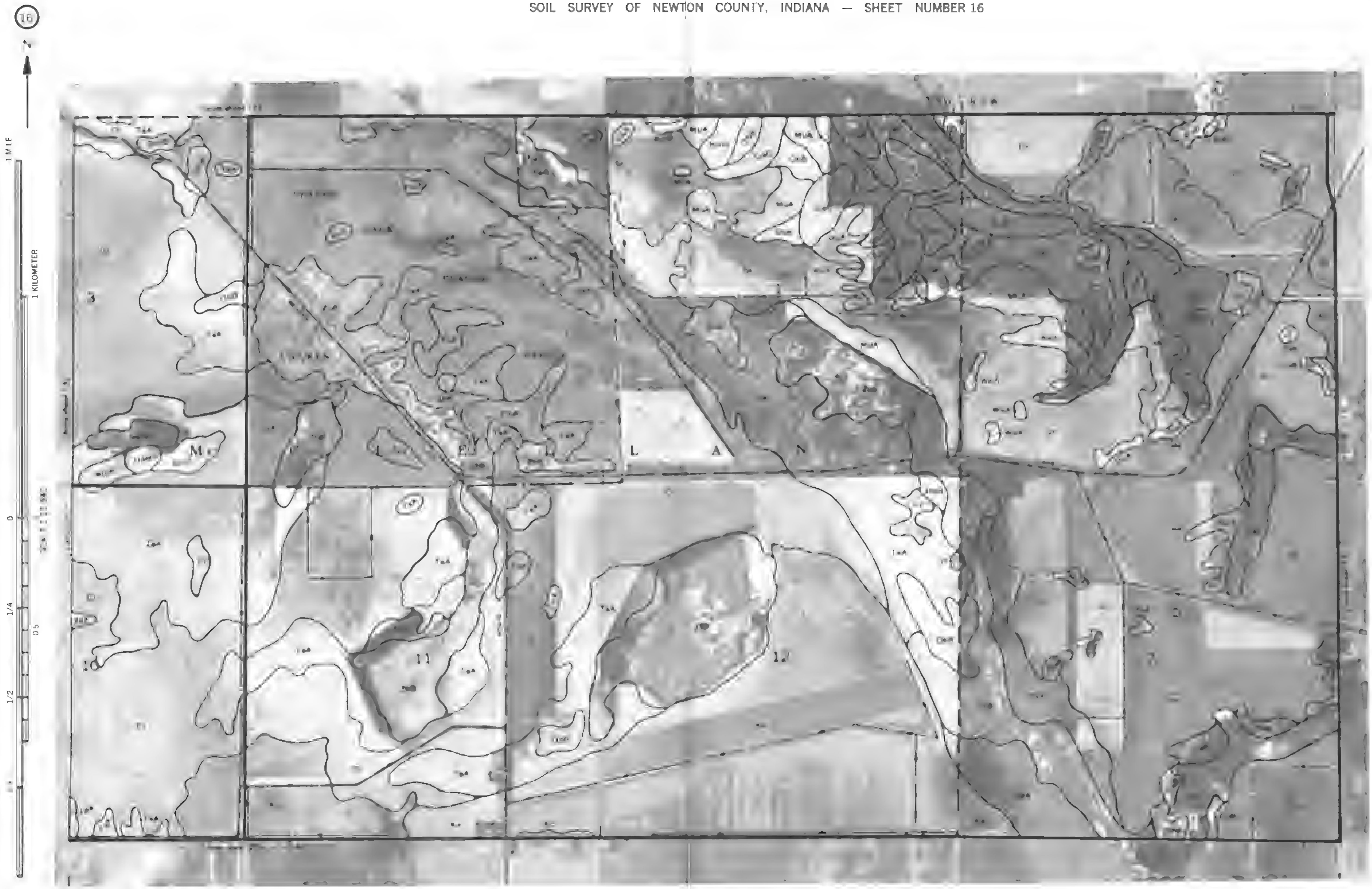
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

NEWTON COUNTY, INDIANA NO. 14

SOIL SURVEY OF NEWTON COUNTY, INDIANA — SHEET NUMBER 15



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land shown, are approximately positioned



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown are approximately positioned

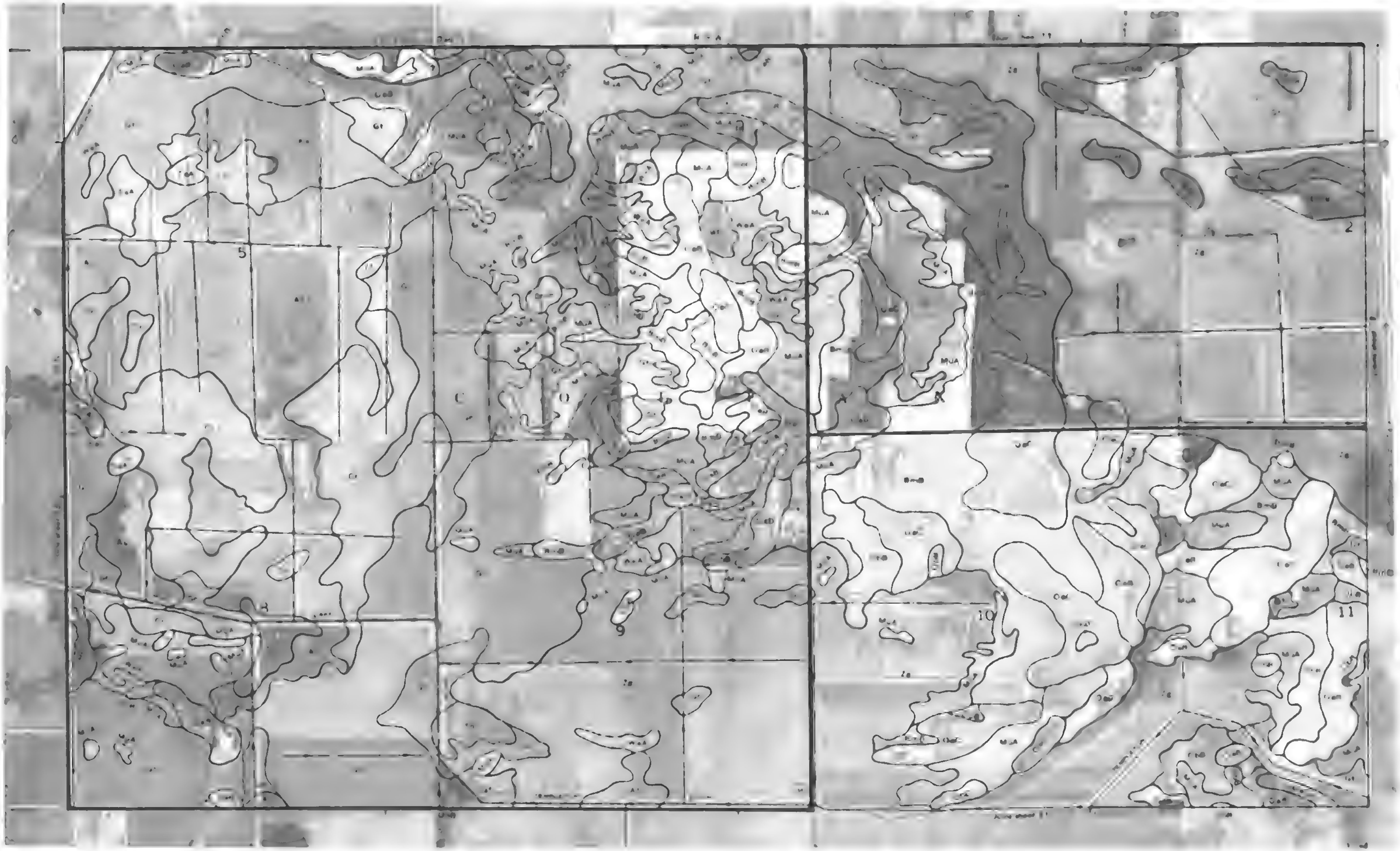
NEWTON COUNTY, INDIANA NO. 16

17

N

NEWTON COUNTY, INDIANA NO. 17

This soil survey map was compiled by the U S Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

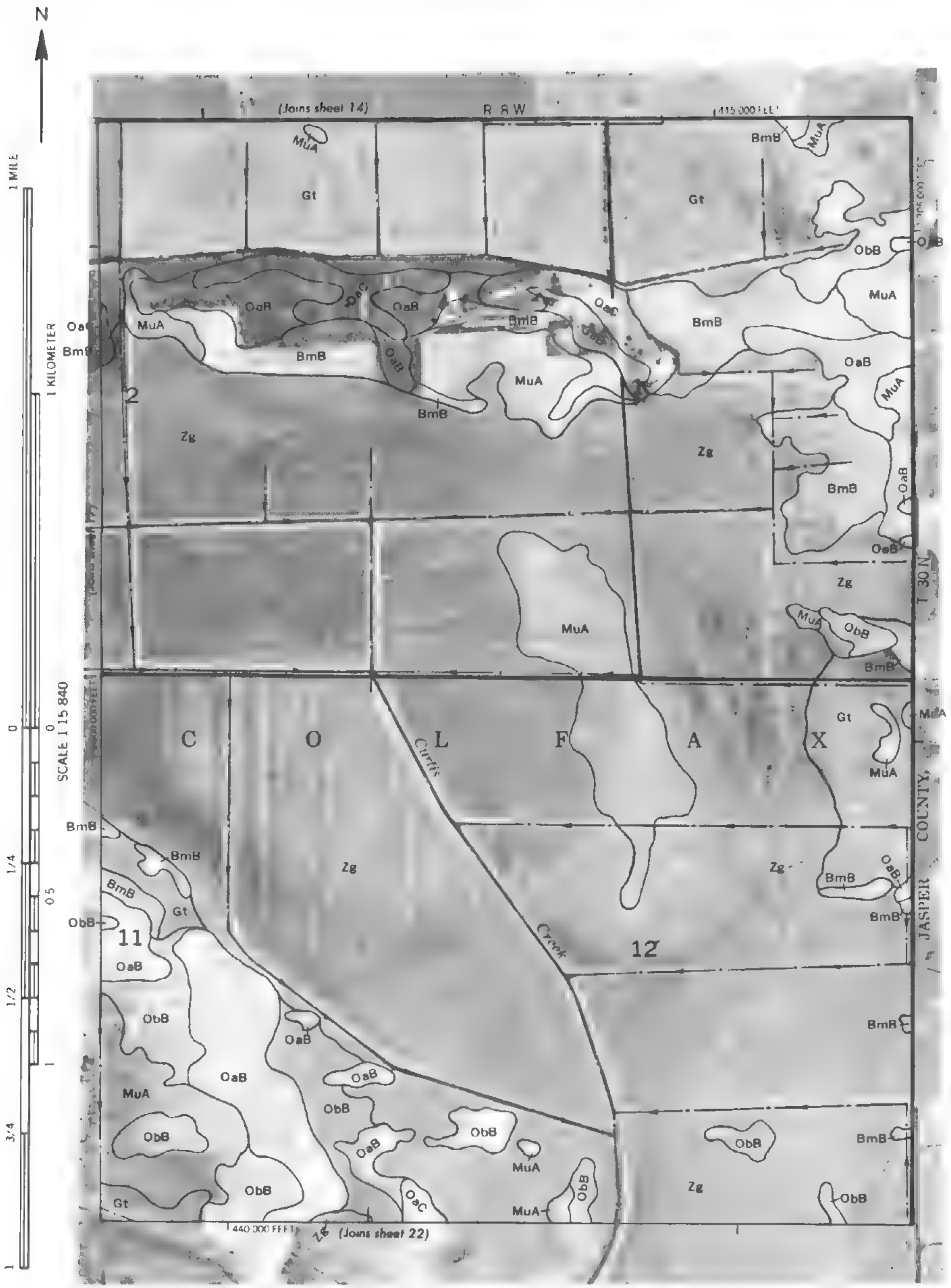


1 KILOMETER

0

SCALE 1:15 840

3/4



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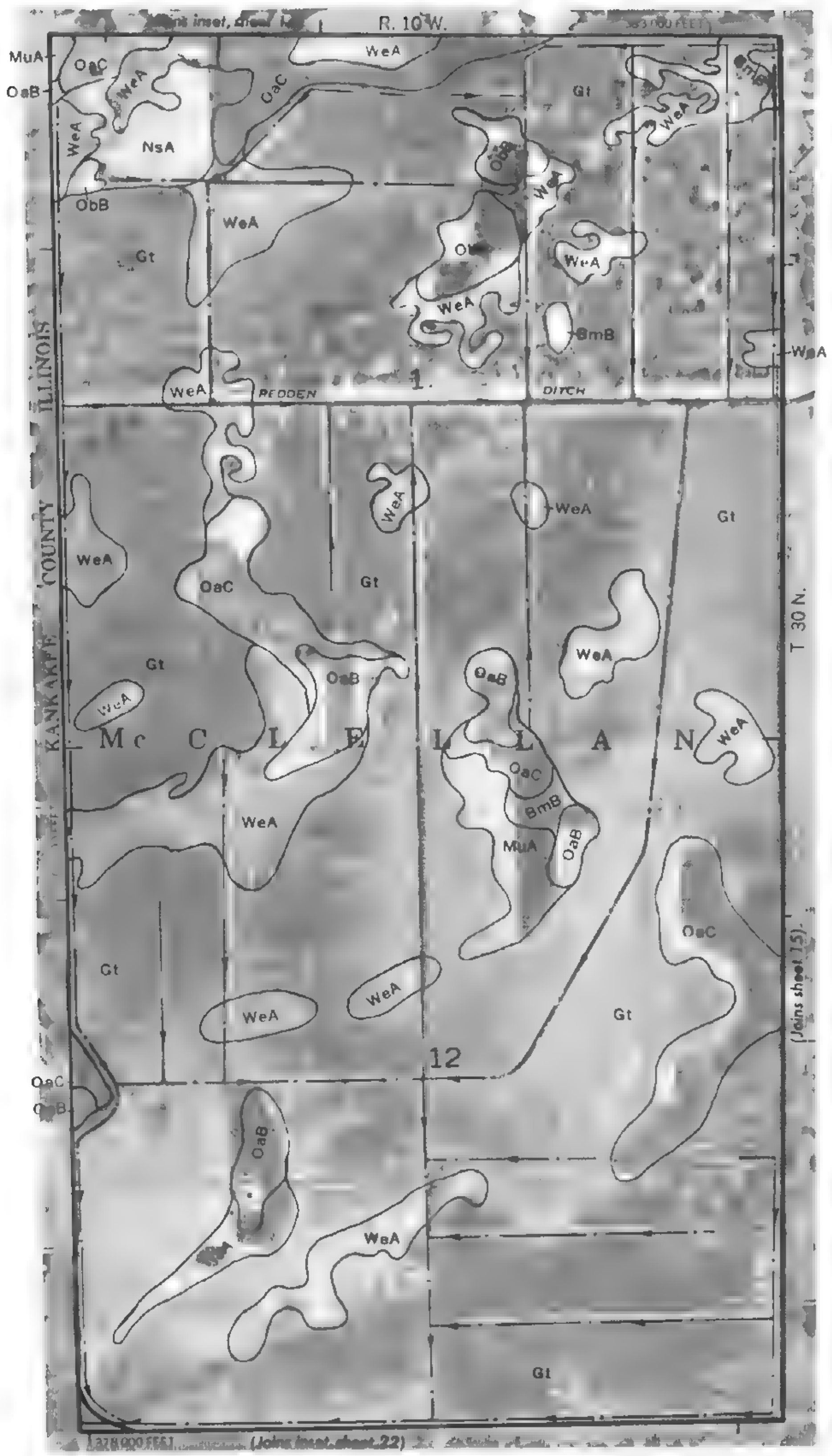
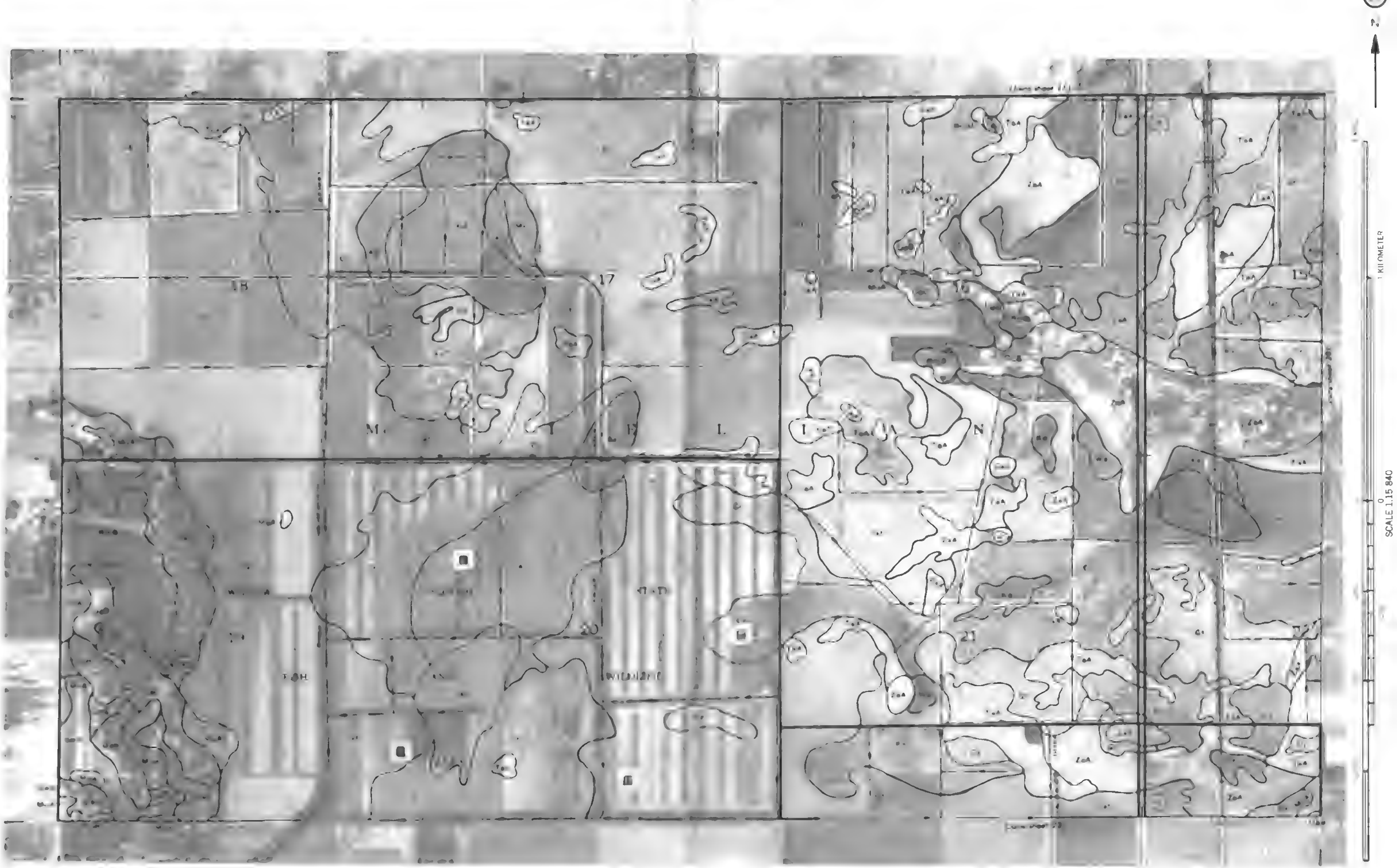


This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

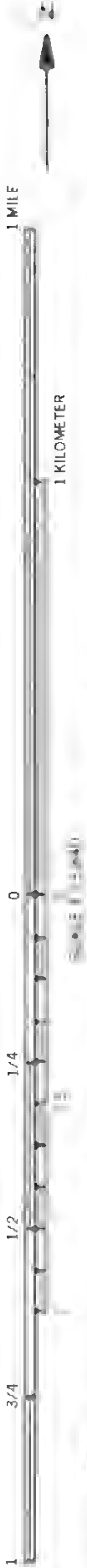
NEWTON COUNTY, INDIANA NO. 18

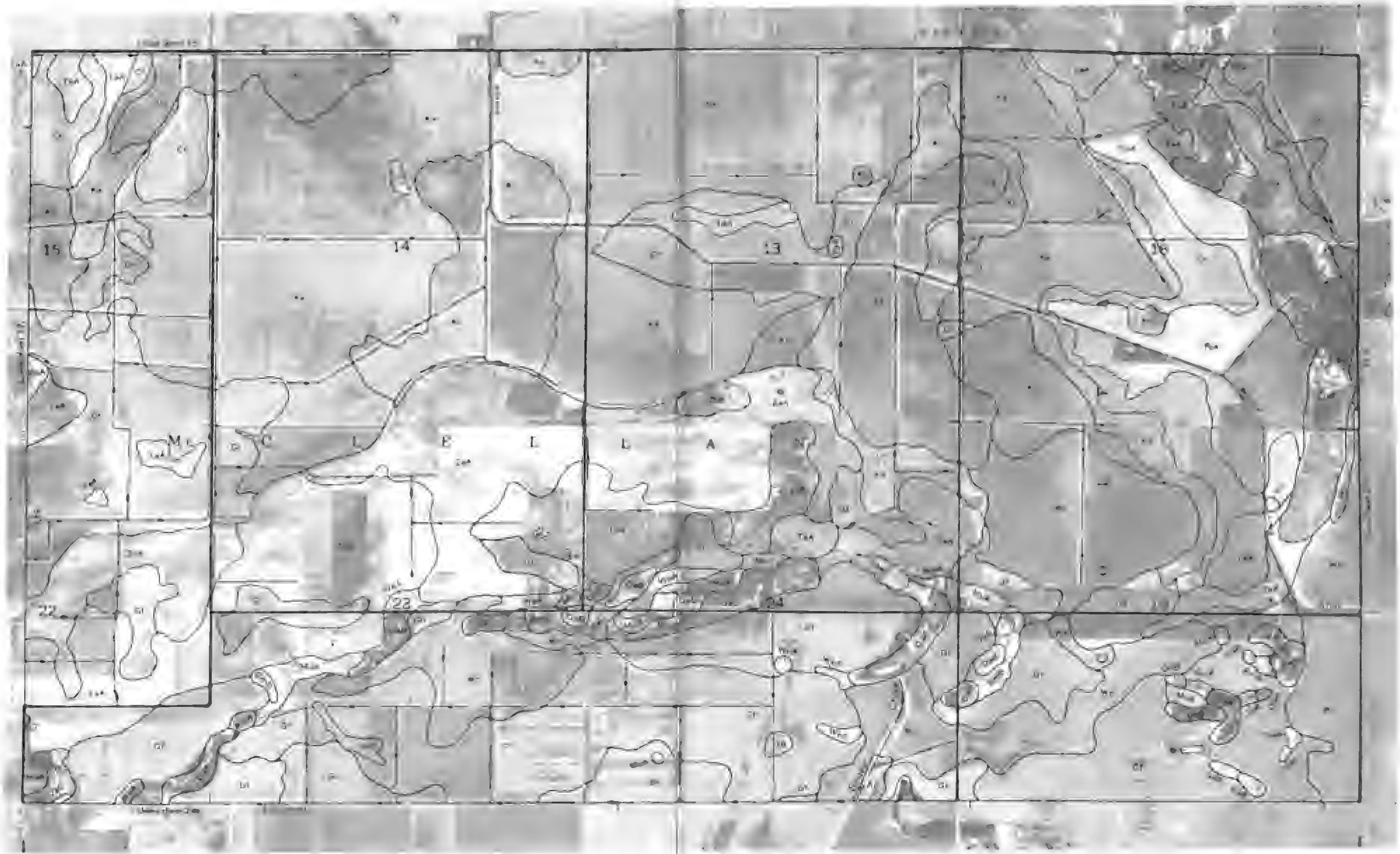


NEWTON COUNTY, INDIANA NO. 19

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

(20)





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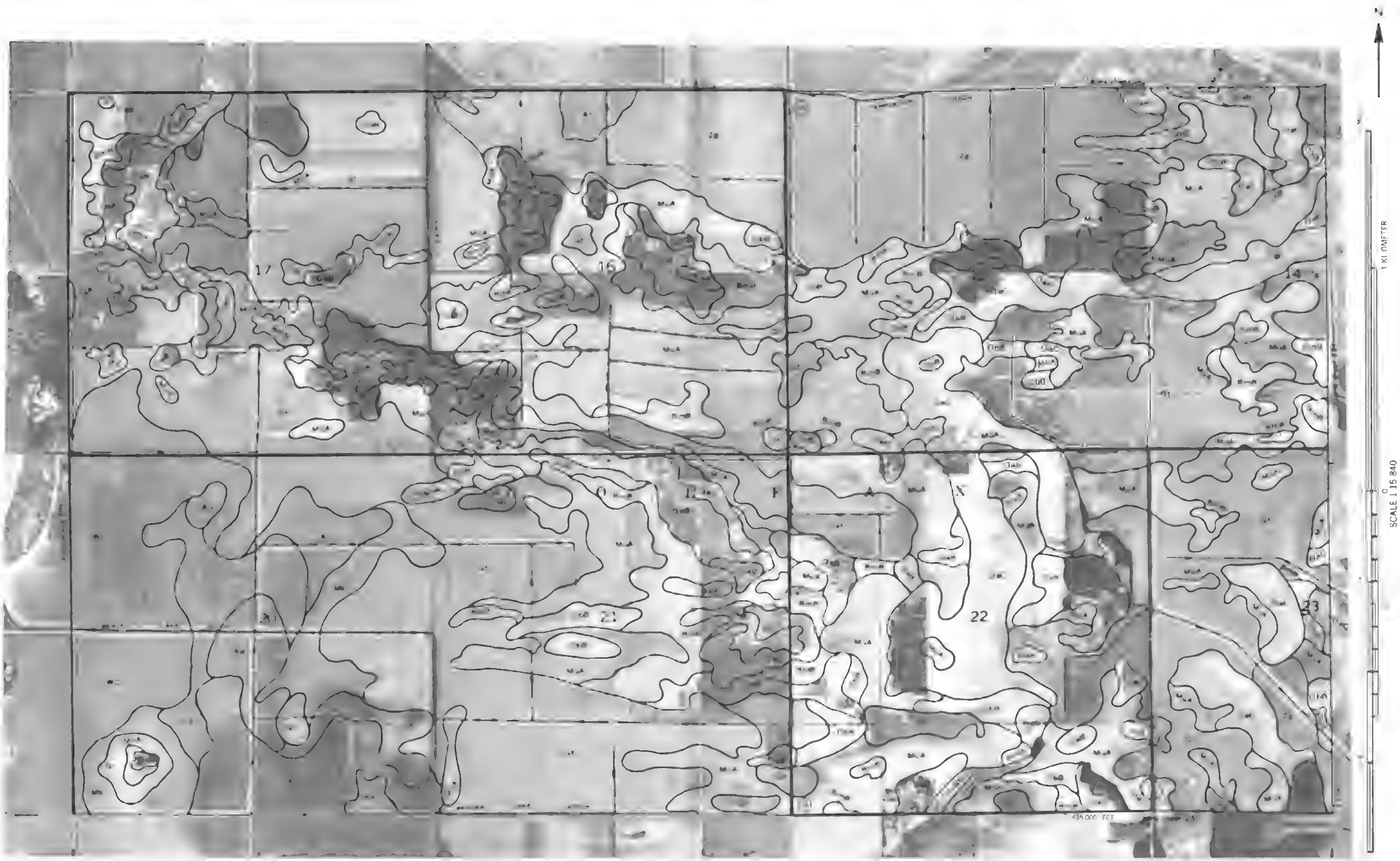
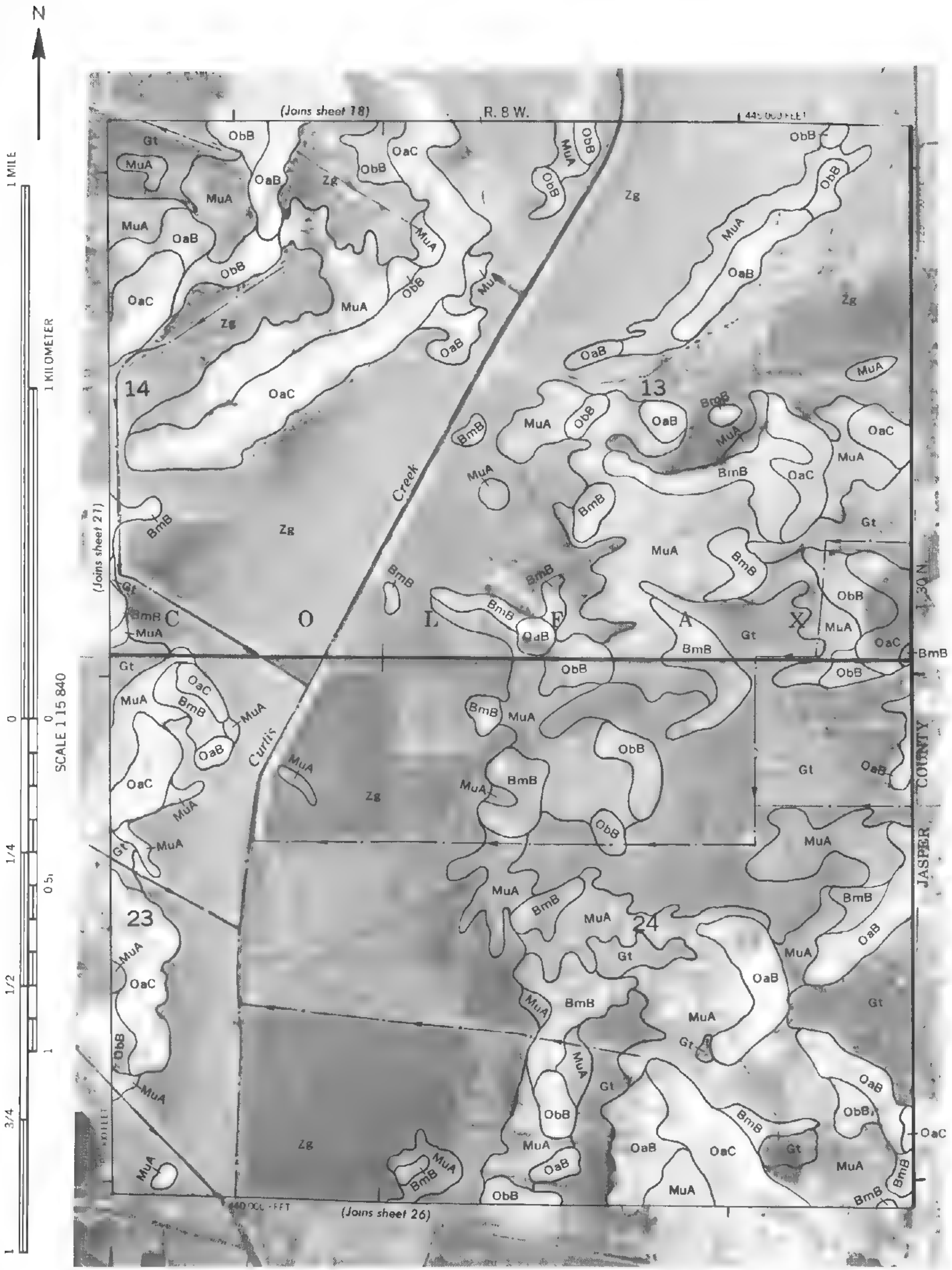
NEWTON COUNTY, INDIANA NO. 21

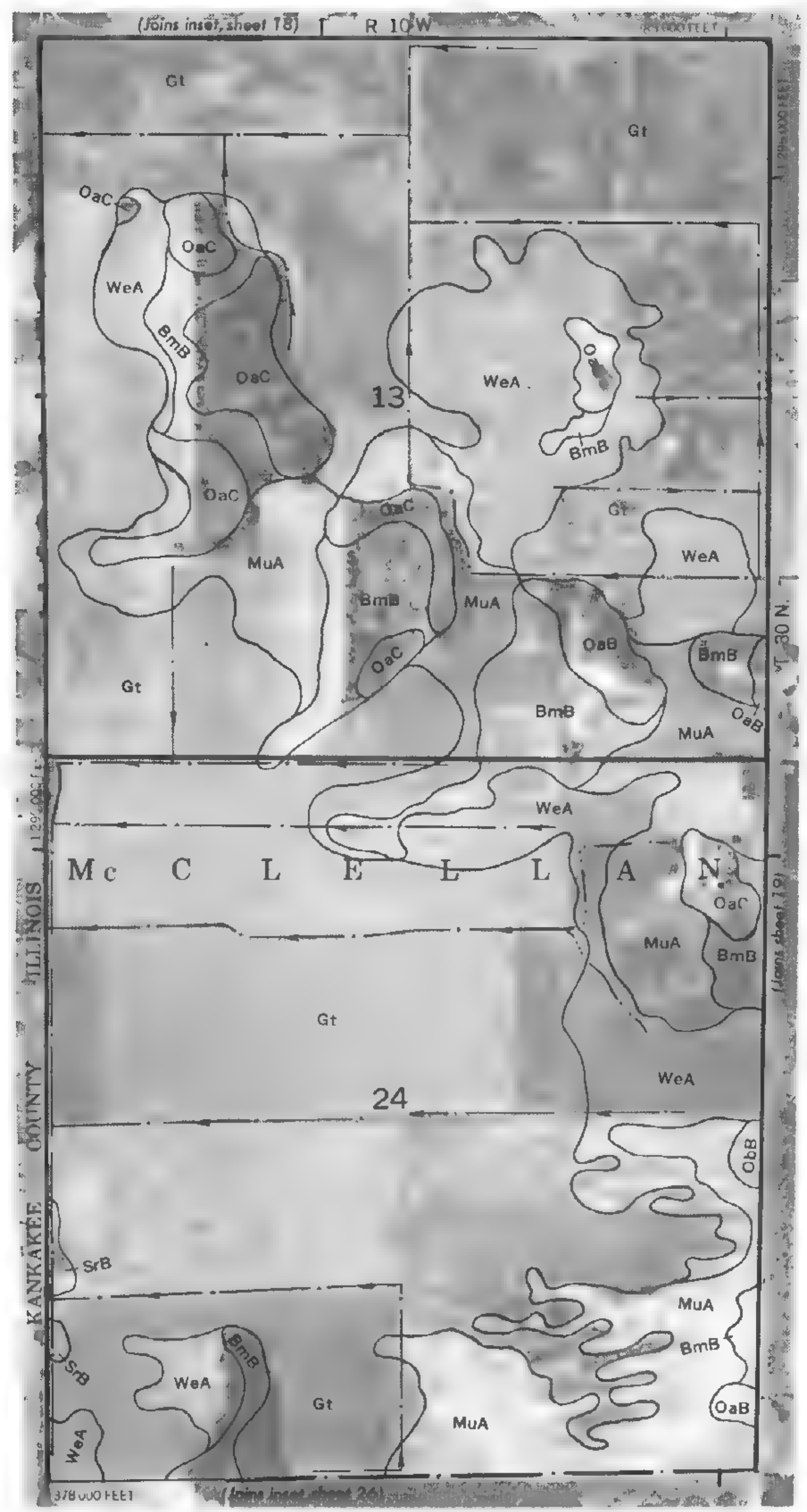
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



SOIL SURVEY OF NEWTON COUNTY, INDIANA — SHEET NUMBER 22



INSET

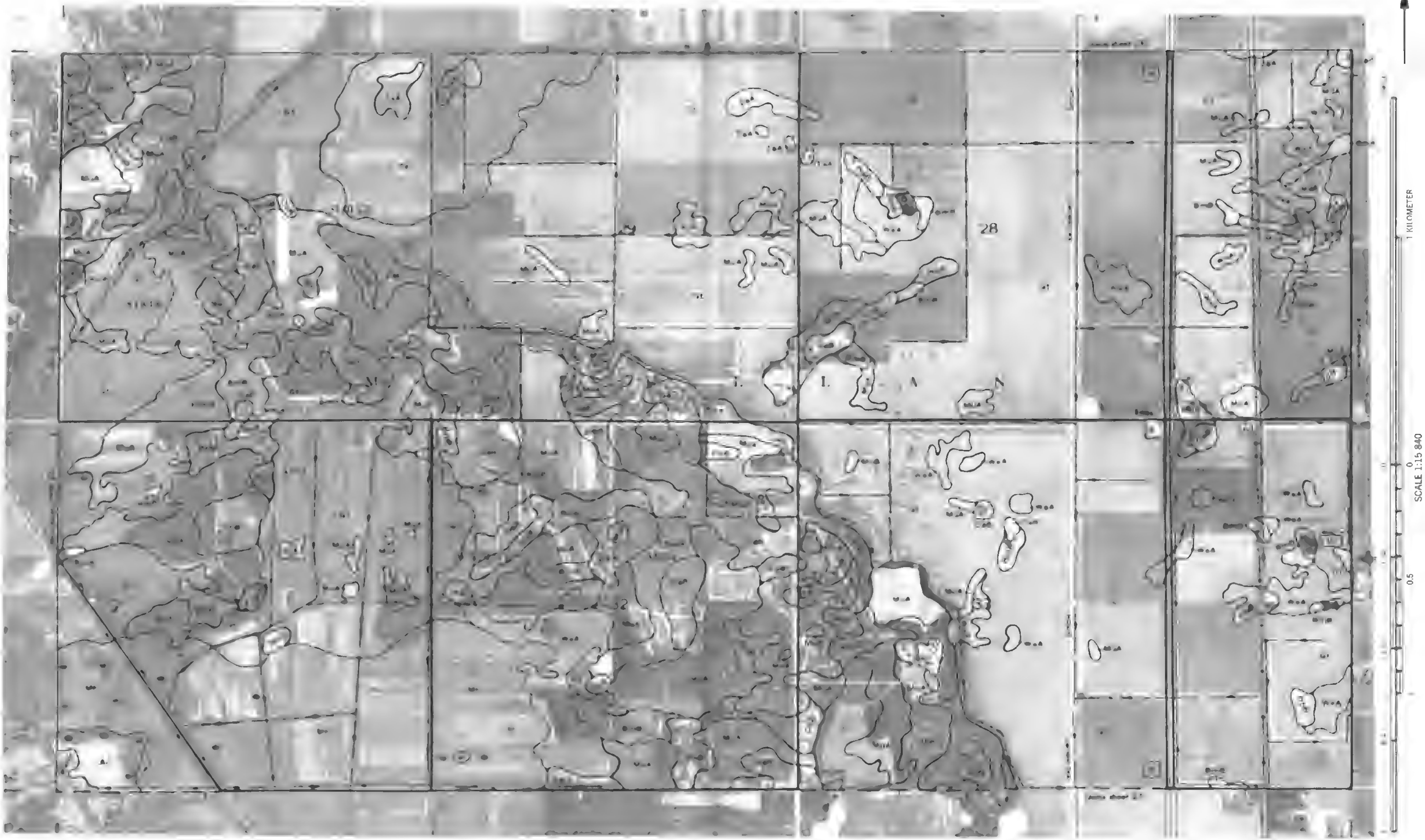


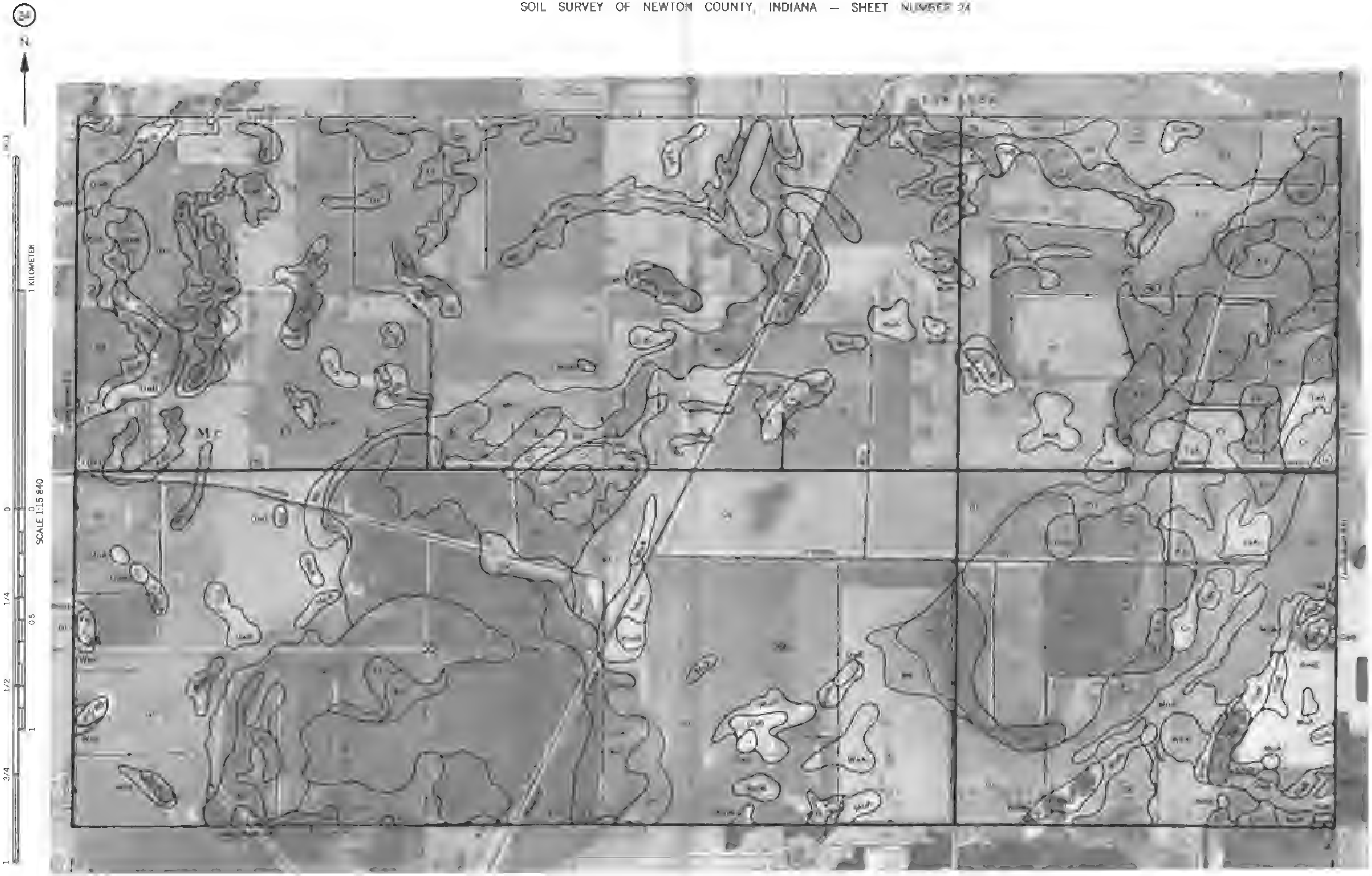
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

NEWTON COUNTY, INDIANA NO. 22

NEWTON COUNTY, INDIANA NO. 23

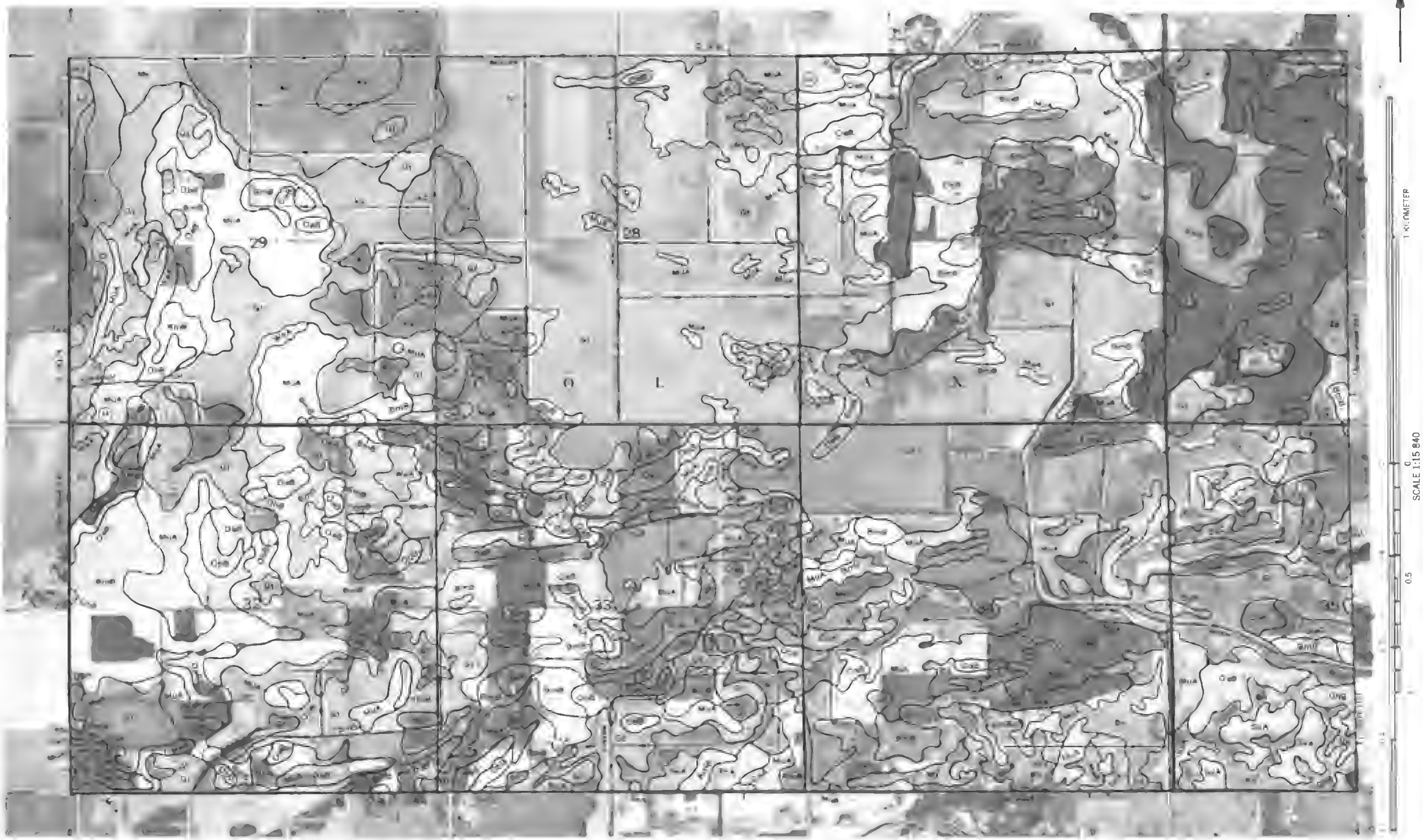
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.





This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

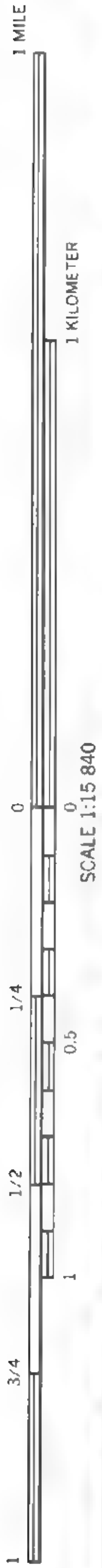
NEWTON COUNTY, INDIANA NO. 24

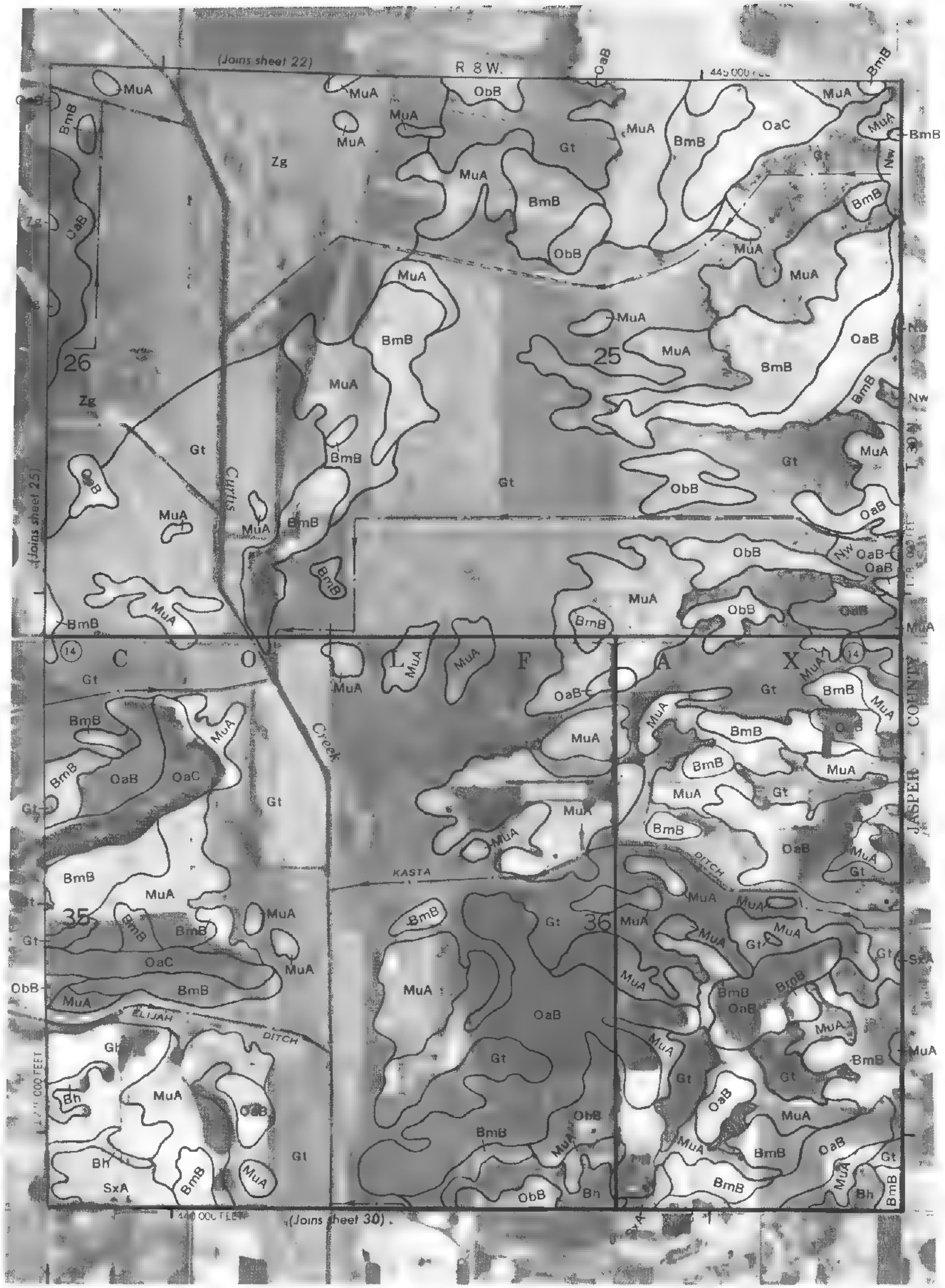


This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF NEWTON COUNTY, INDIANA — SHEET NUMBER 26

N





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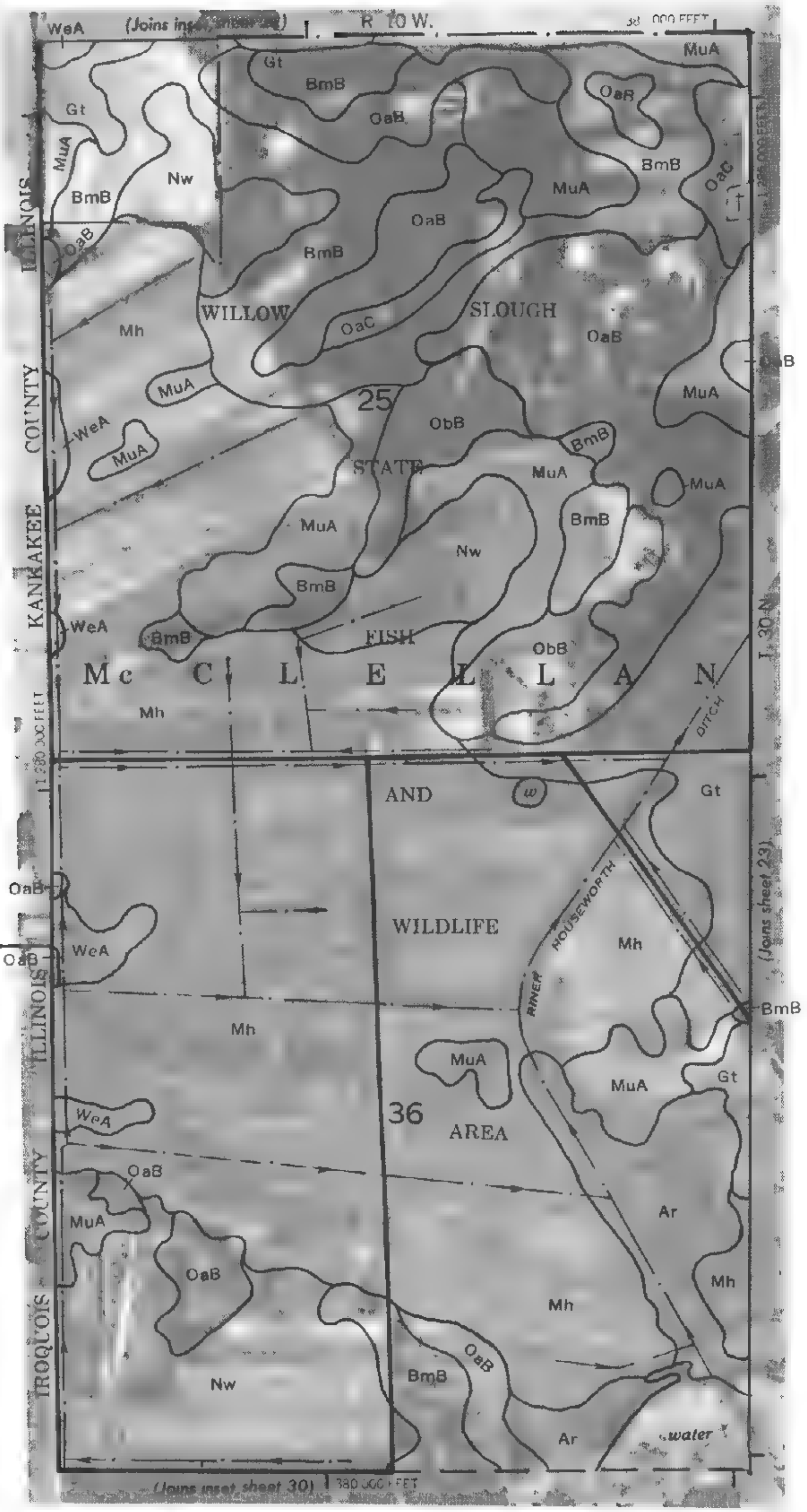


3000 AND 5000-FOOT GRID TICKS

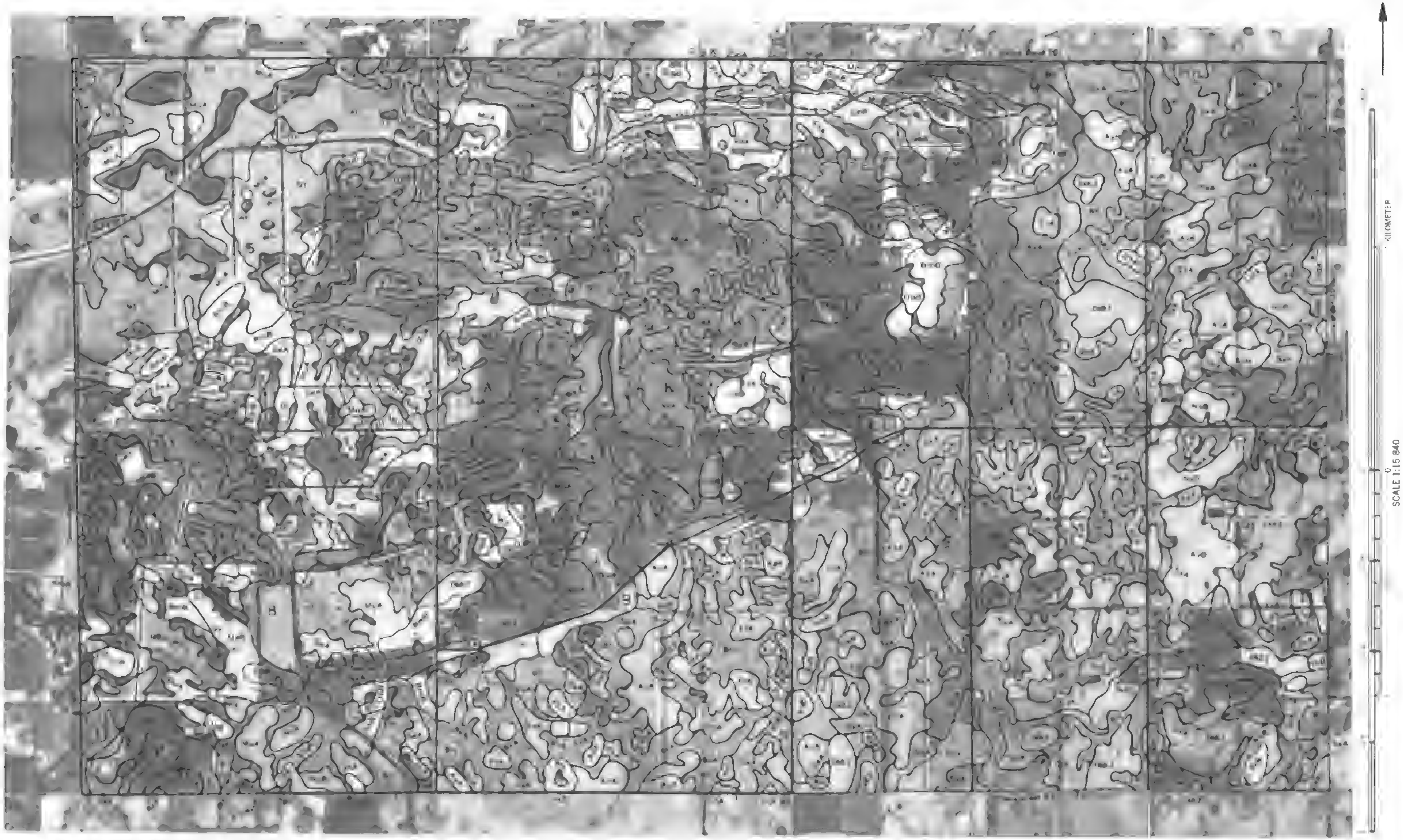
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

NEWTON COUNTY, INDIANA NO. 26

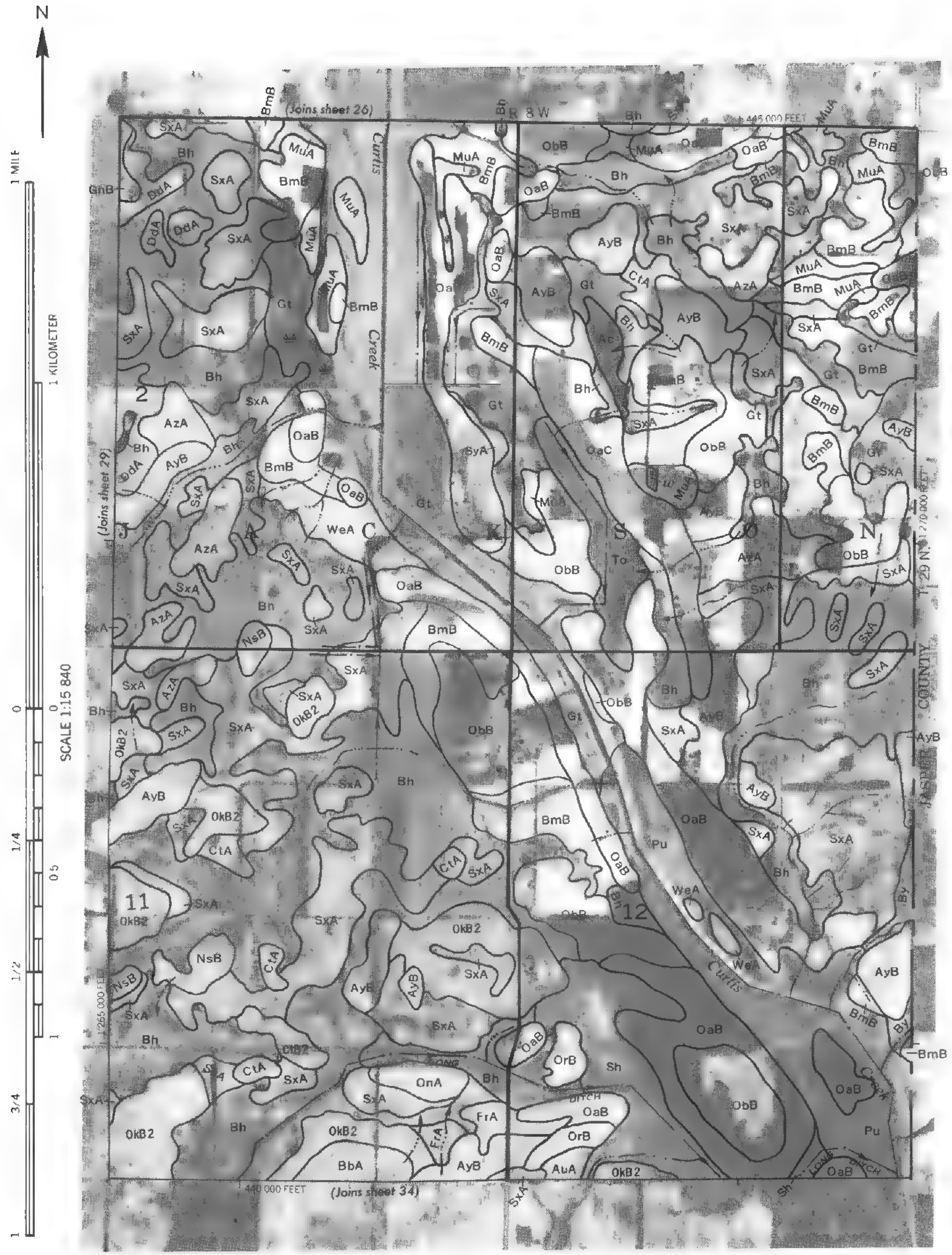
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if [illegible] ximately positioned

This soil survey map was compiled by the U S Department of Agriculture, Soil Conservation Service, and cooperating agencies Base maps are prepared from 1982 aerial photography Coordinate grid ticks and land division corner— shown, are appr

SOIL SURVEY OF NEWTON COUNTY, INDIANA — SHEET NUMBER 29



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



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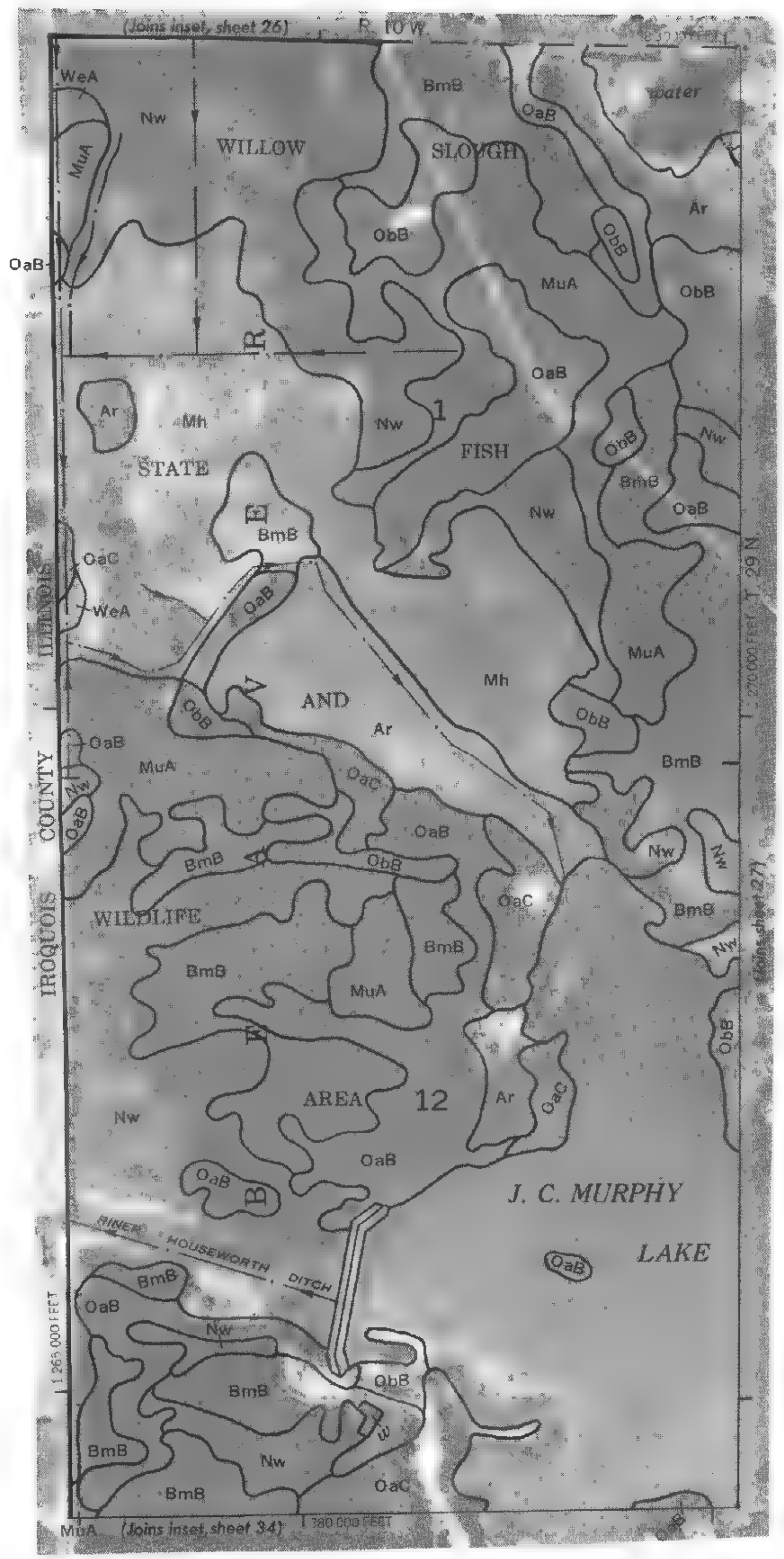
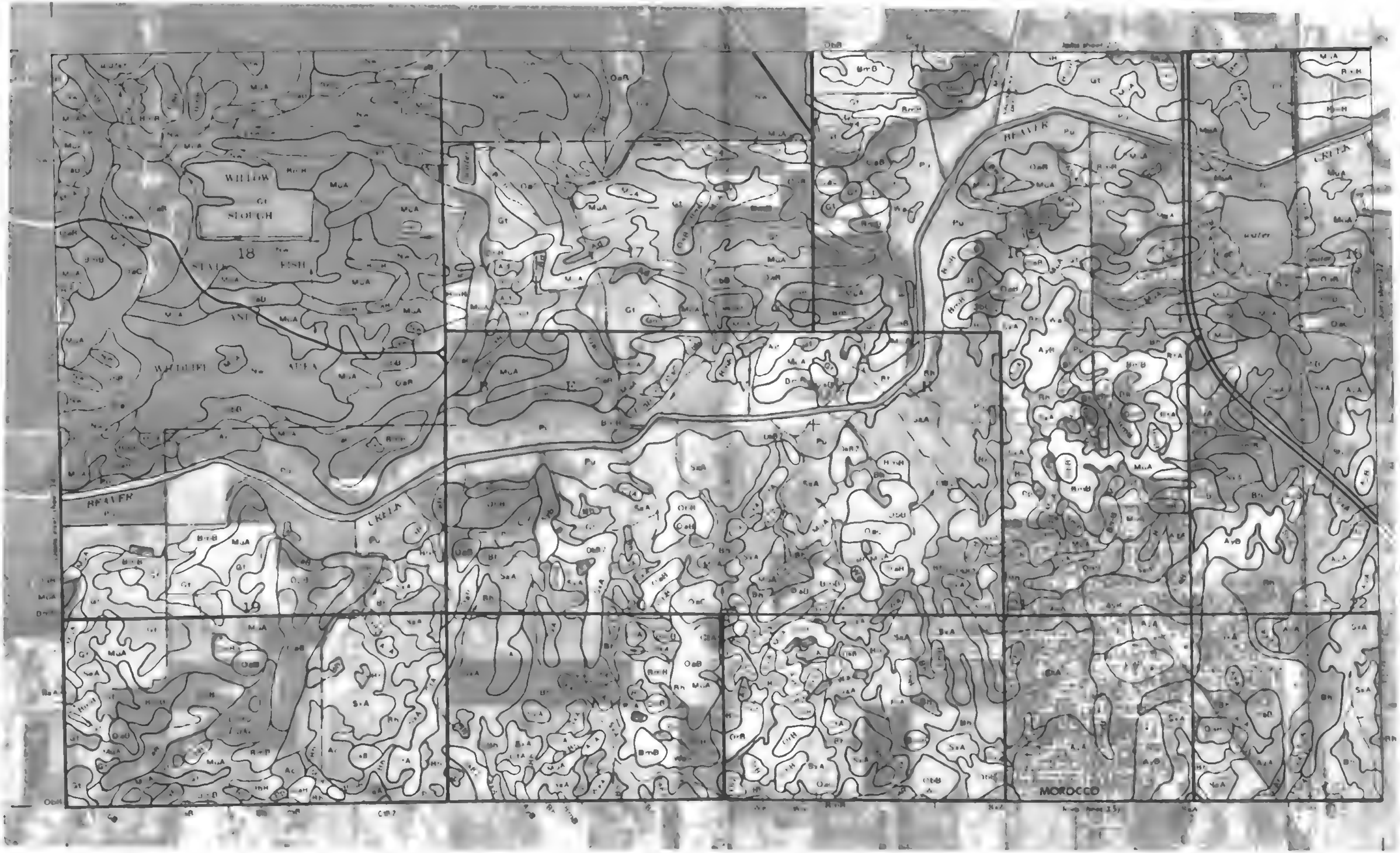


3000 AND 5000 FOOT GRID TICKS

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

31



N

1 KILOMETER

0

0.5

SCALE 1:15 840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

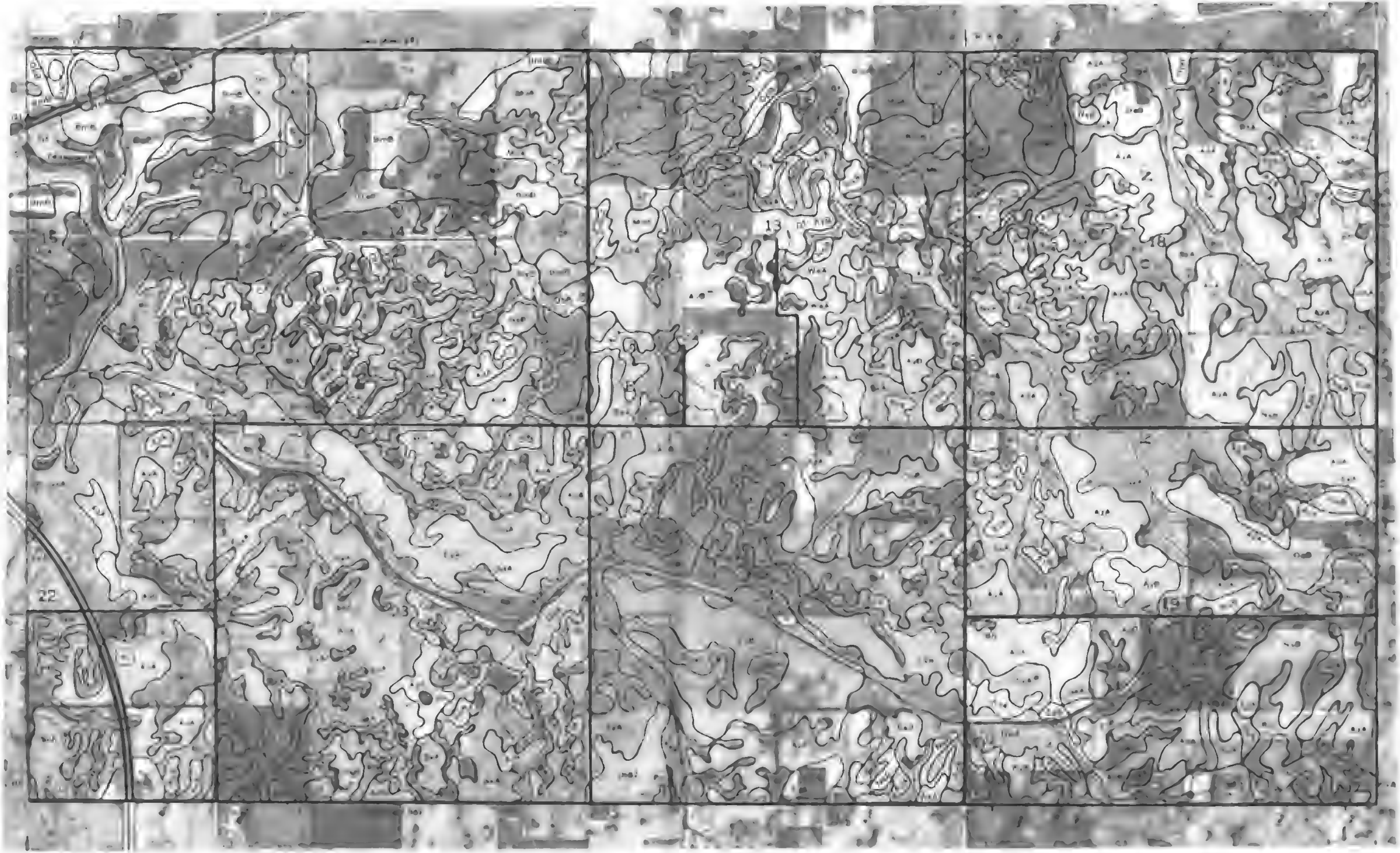
N

SCALE 1:15 840

1 KILOMETER

0 0.5

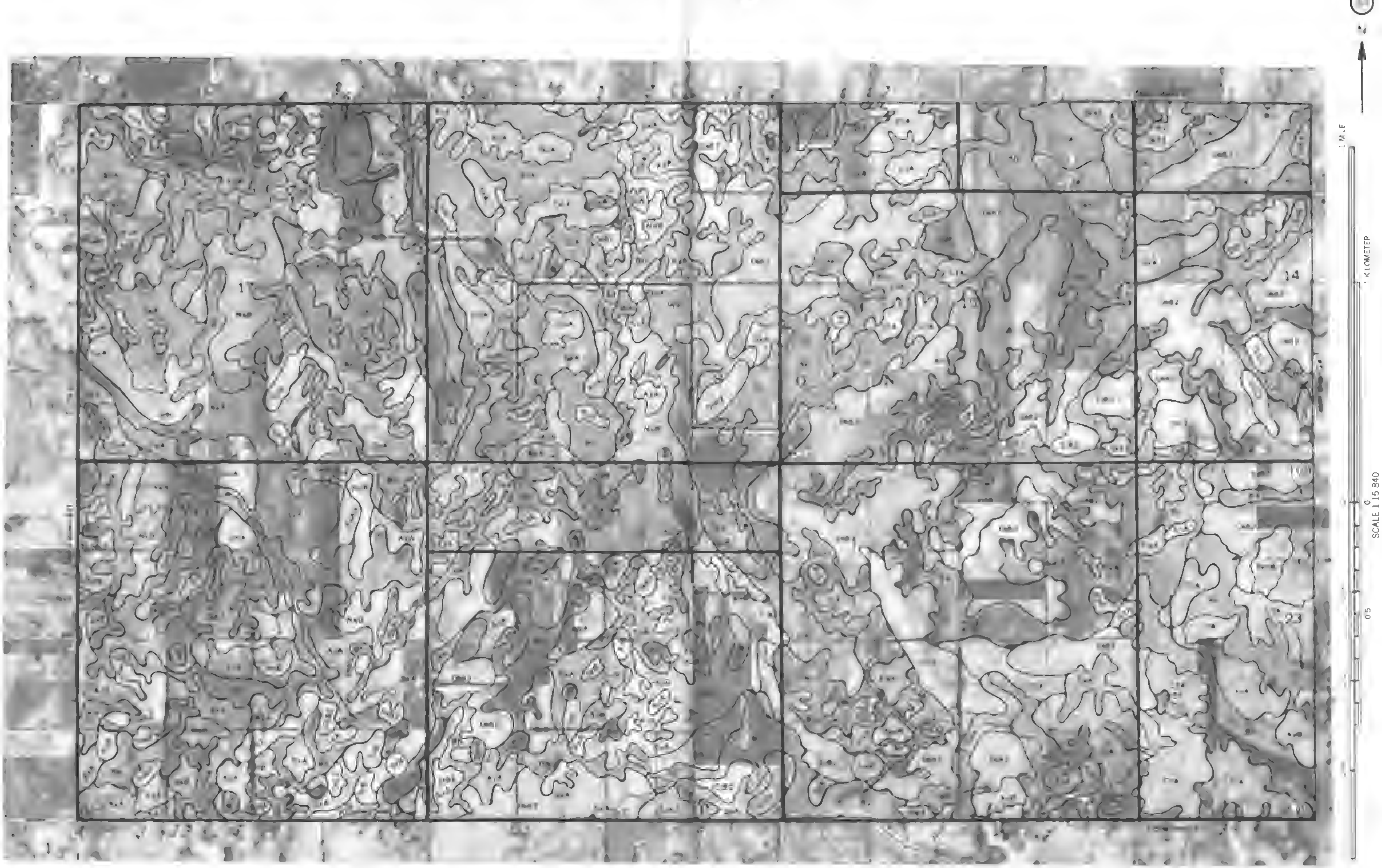
0 1/4 1/2 3/4



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

NEWTON COUNTY, INDIANA NO. 33

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



SOIL SURVEY OF NEWTON COUNTY, INDIANA — SHEET NUMBER 34

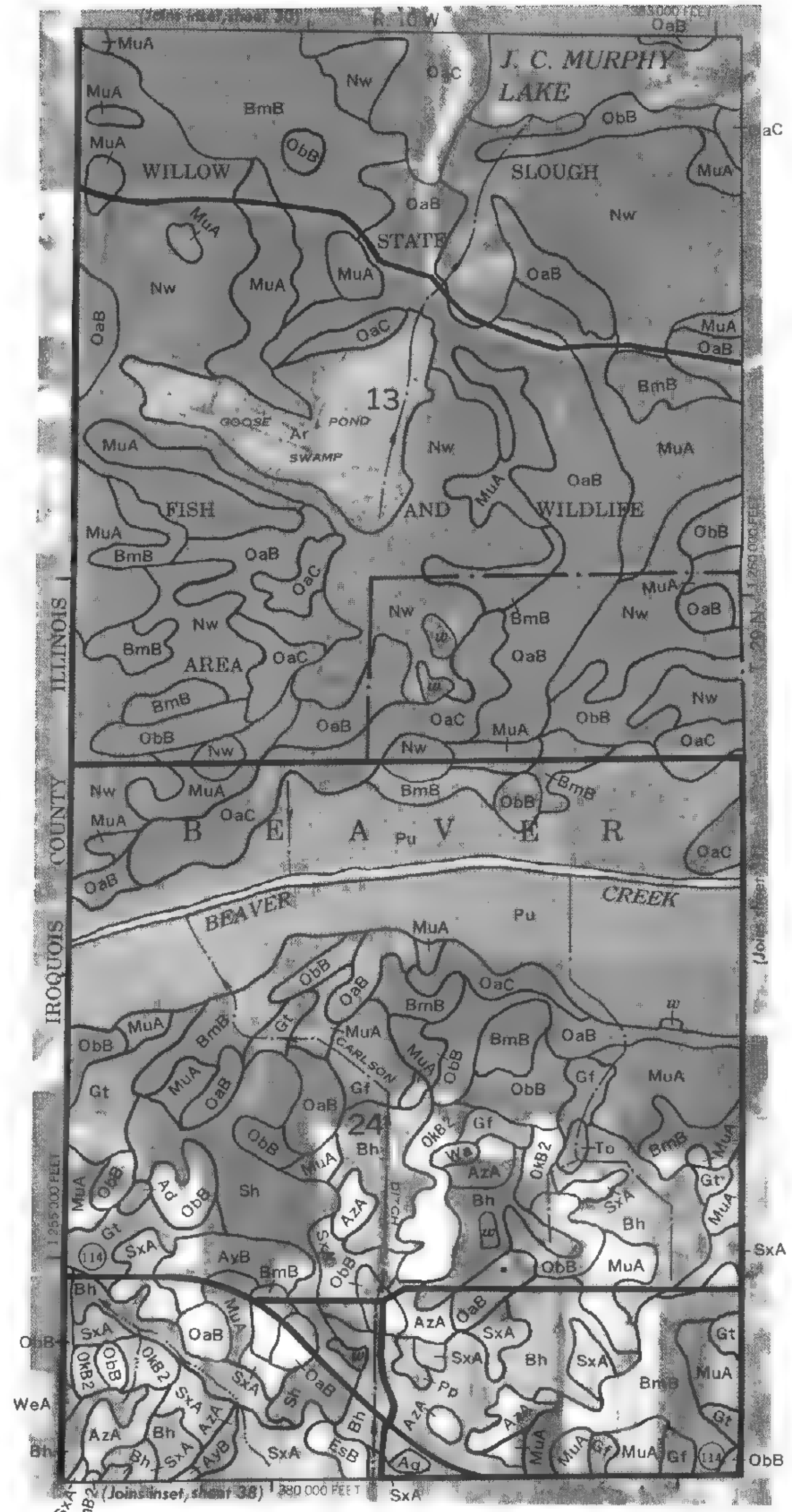
N

1 MILE

1 KILOMETER

SCALE 1:15 840

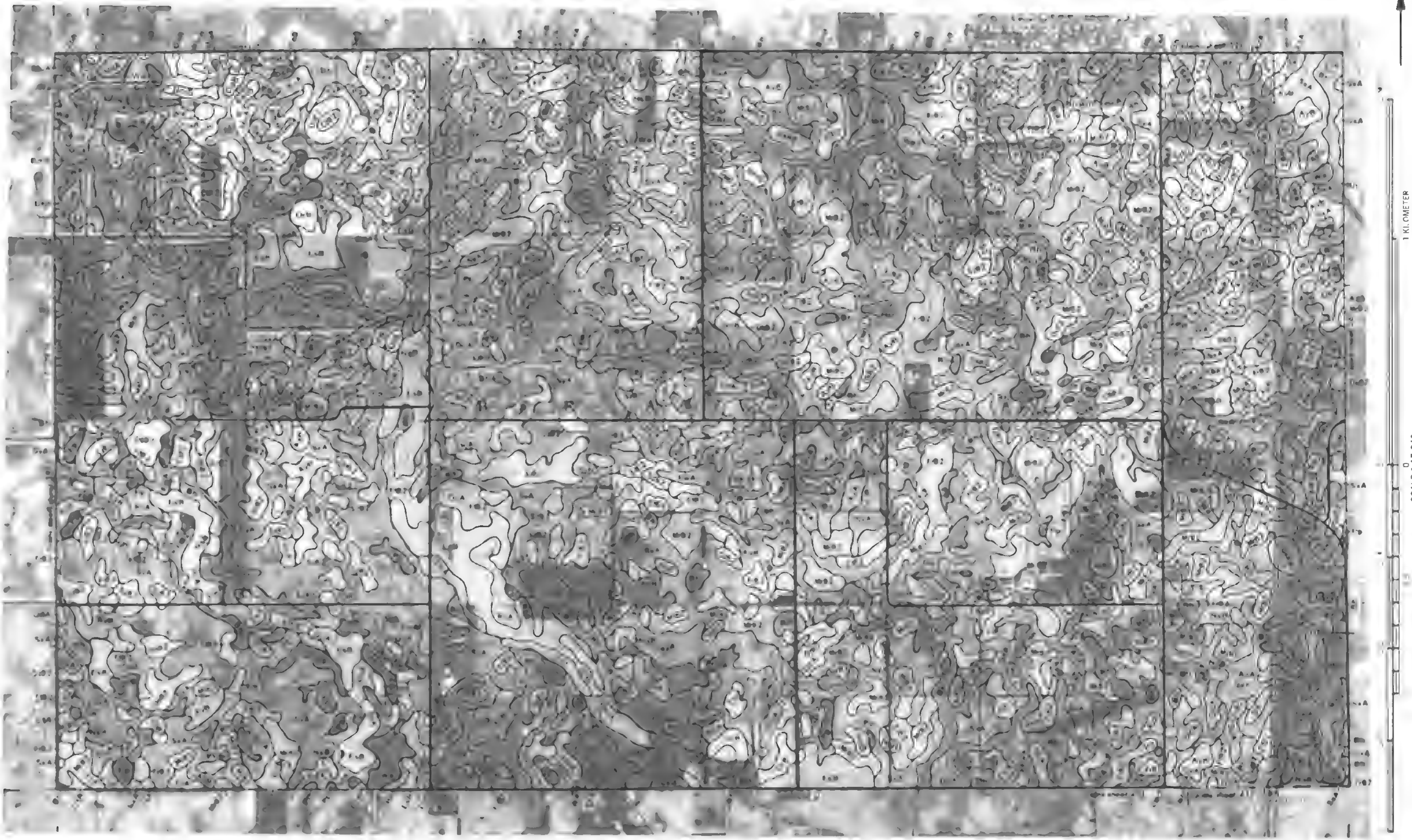
INSET



3000 AND 5000 FOOT GRID TICKS

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned

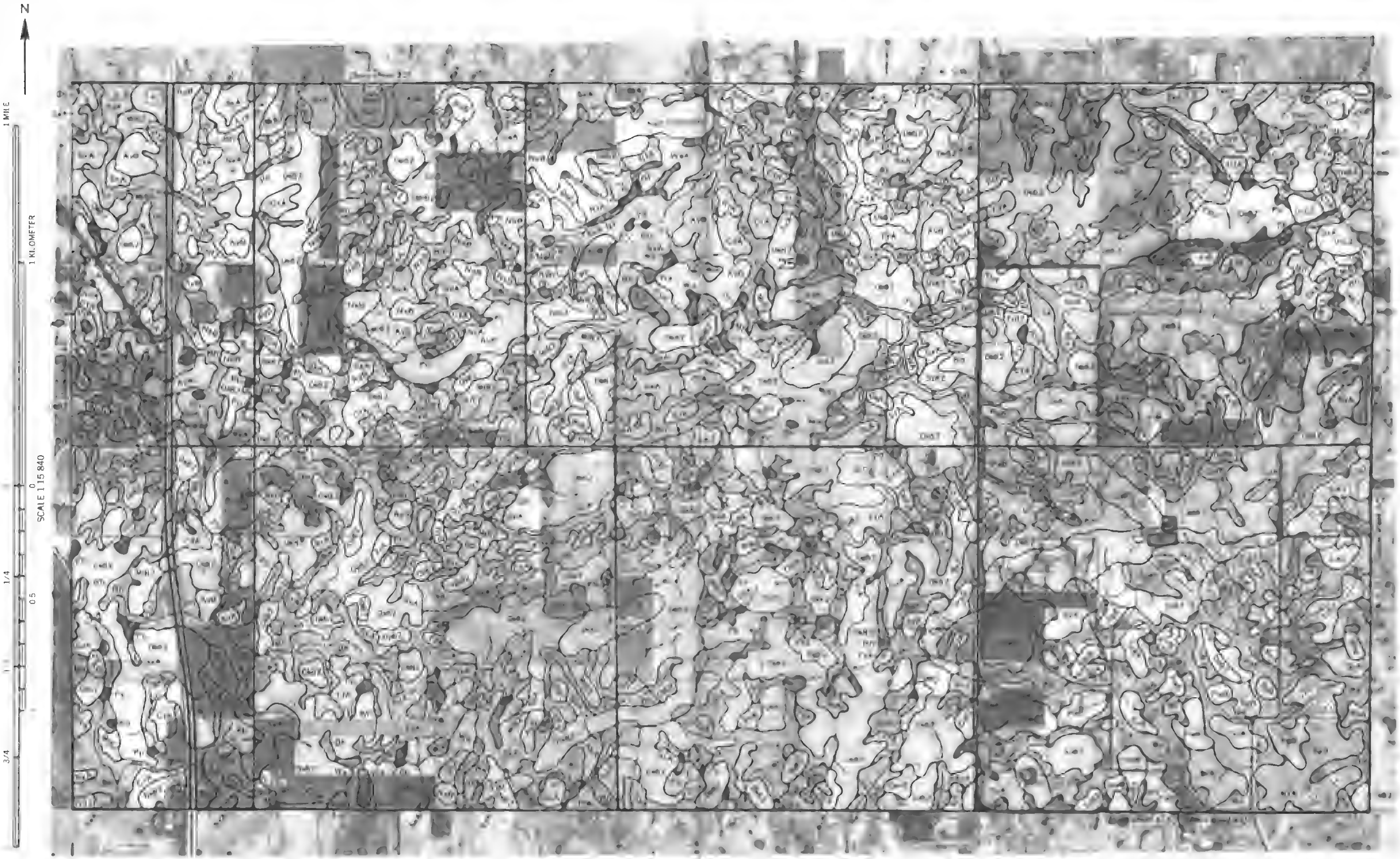
NEWTON COUNTY, INDIANA NO. 34



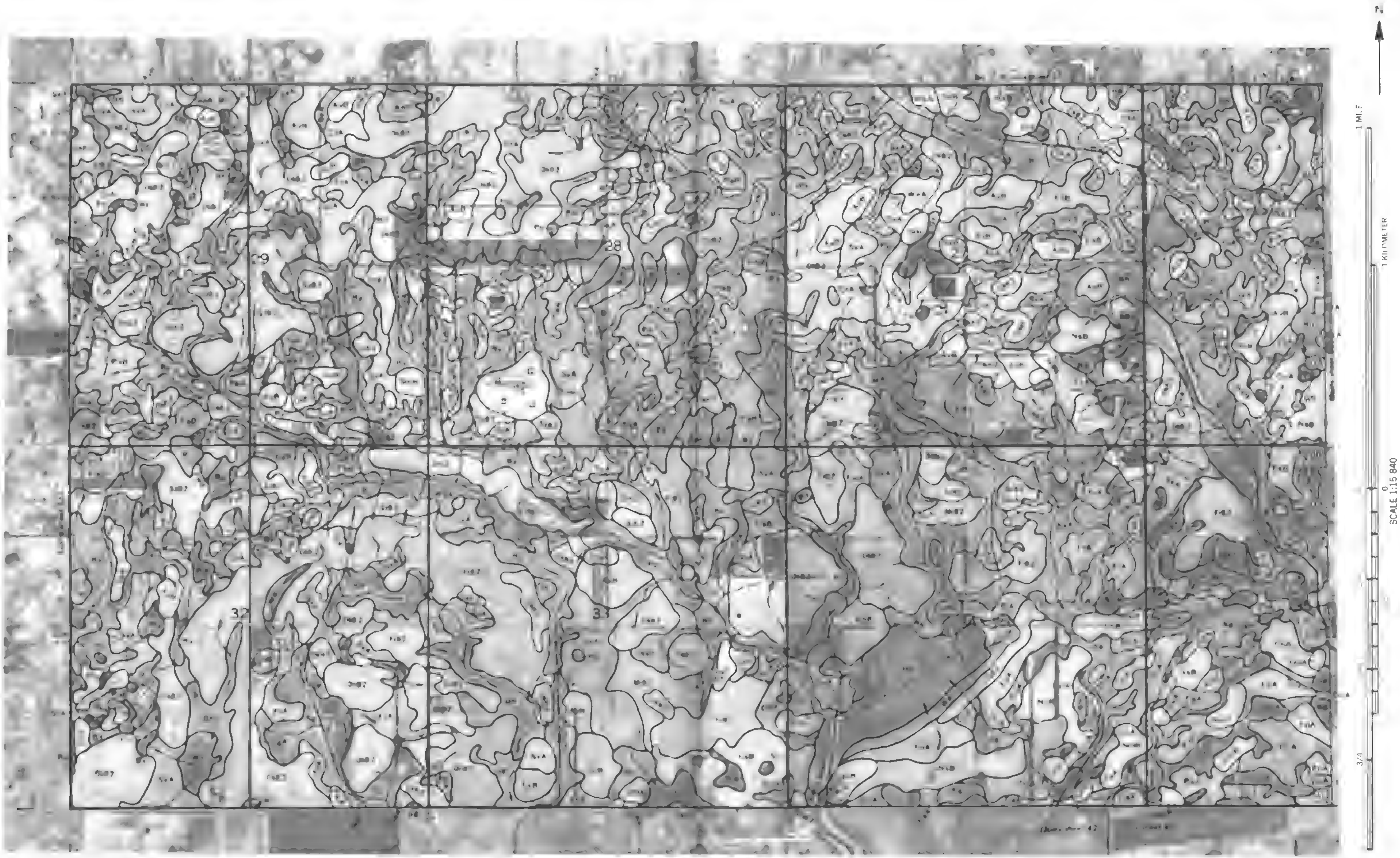
NEWTON COUNTY, INDIANA NO. 35

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF NEWTON COUNTY, INDIANA — SHEET NUMBER 36



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

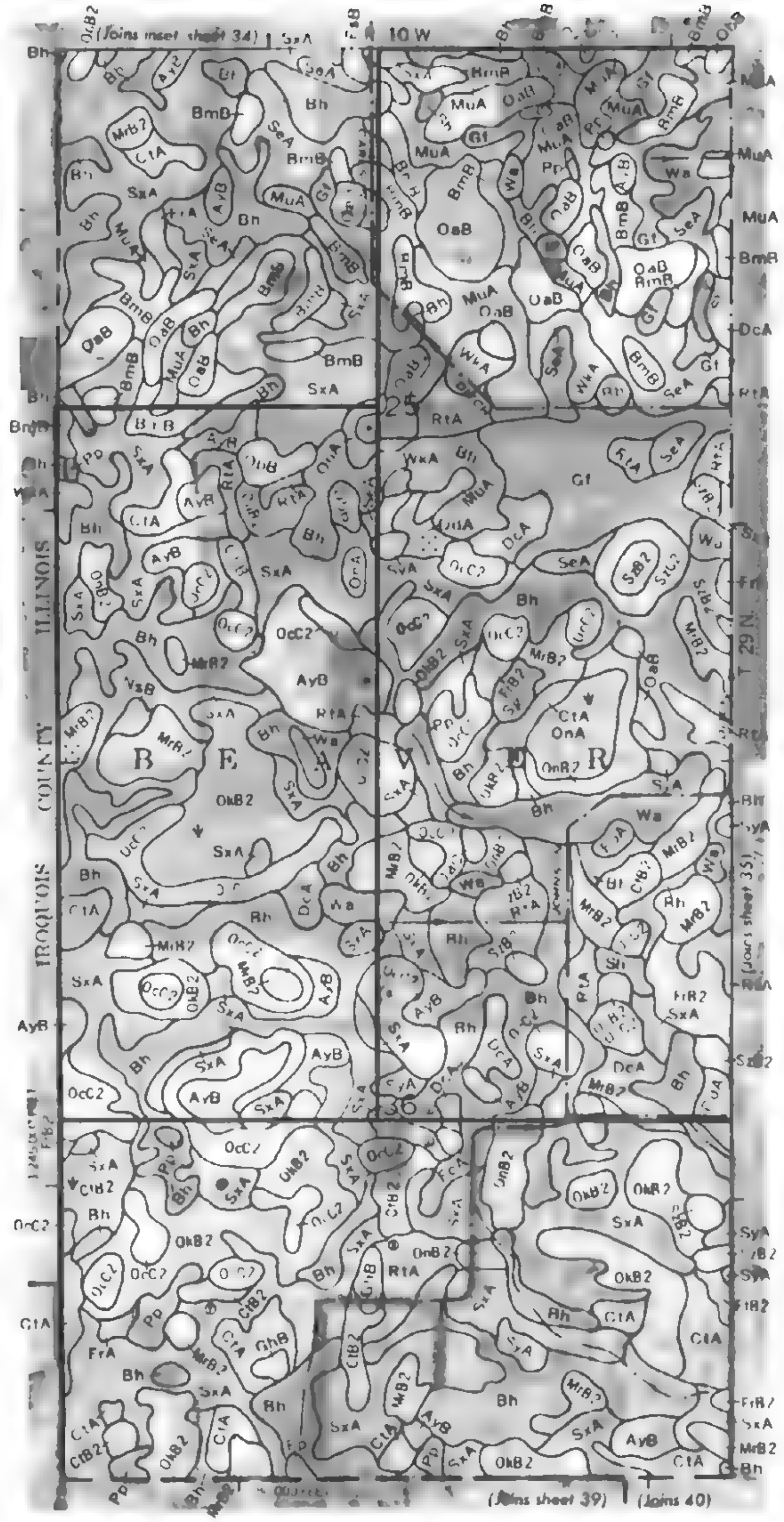


NEWTON COUNTY, INDIANA NO. 37

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

INSET

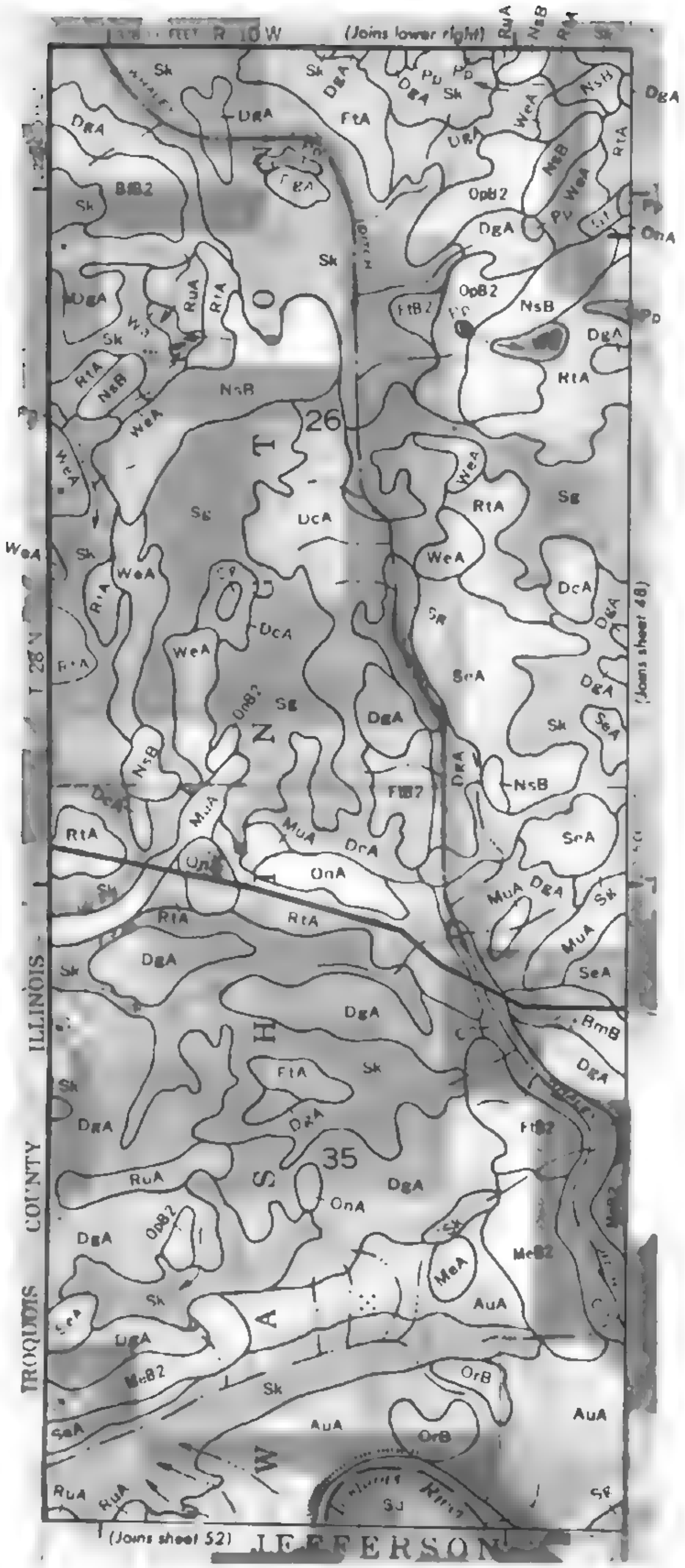


This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

NEWTON COUNTY, INDIANA NO. 39

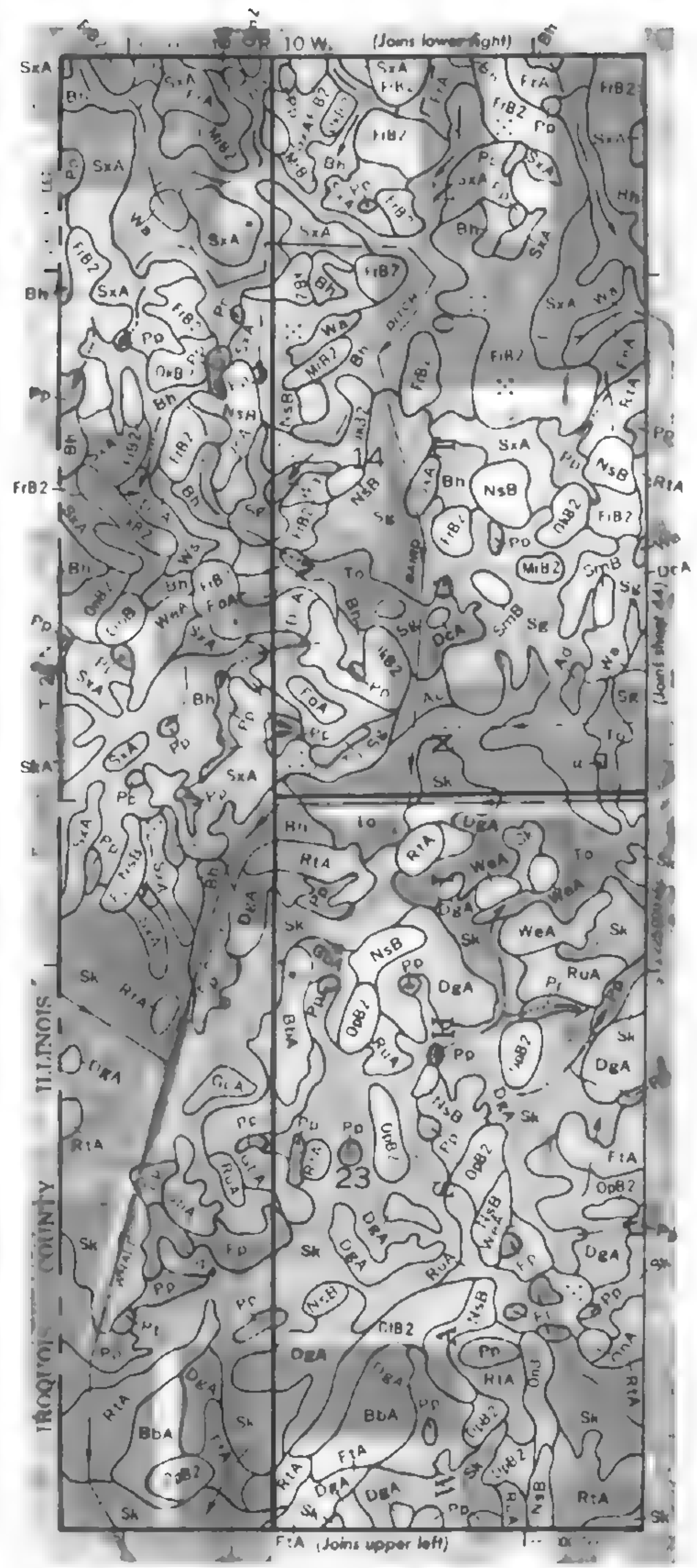
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown are approximately positioned.

INSET B

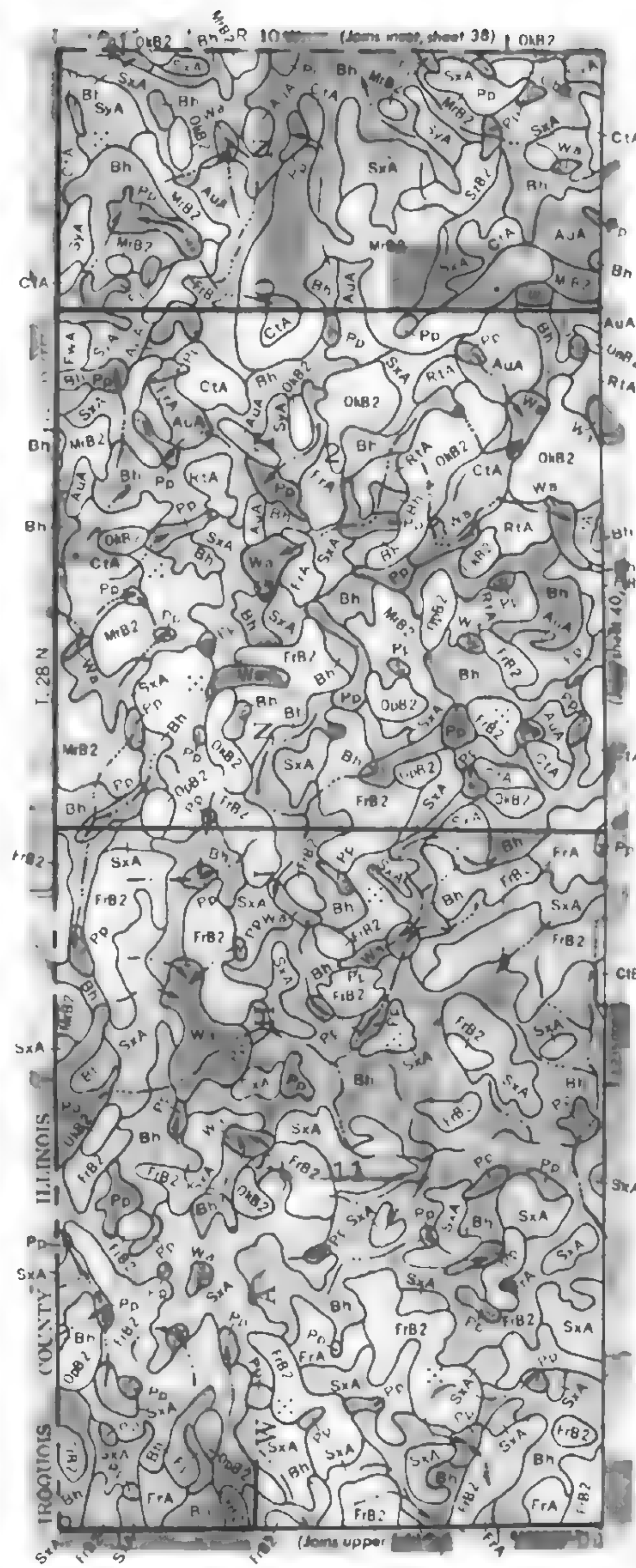


3000 AND 5000-FOOT GRID TICKS

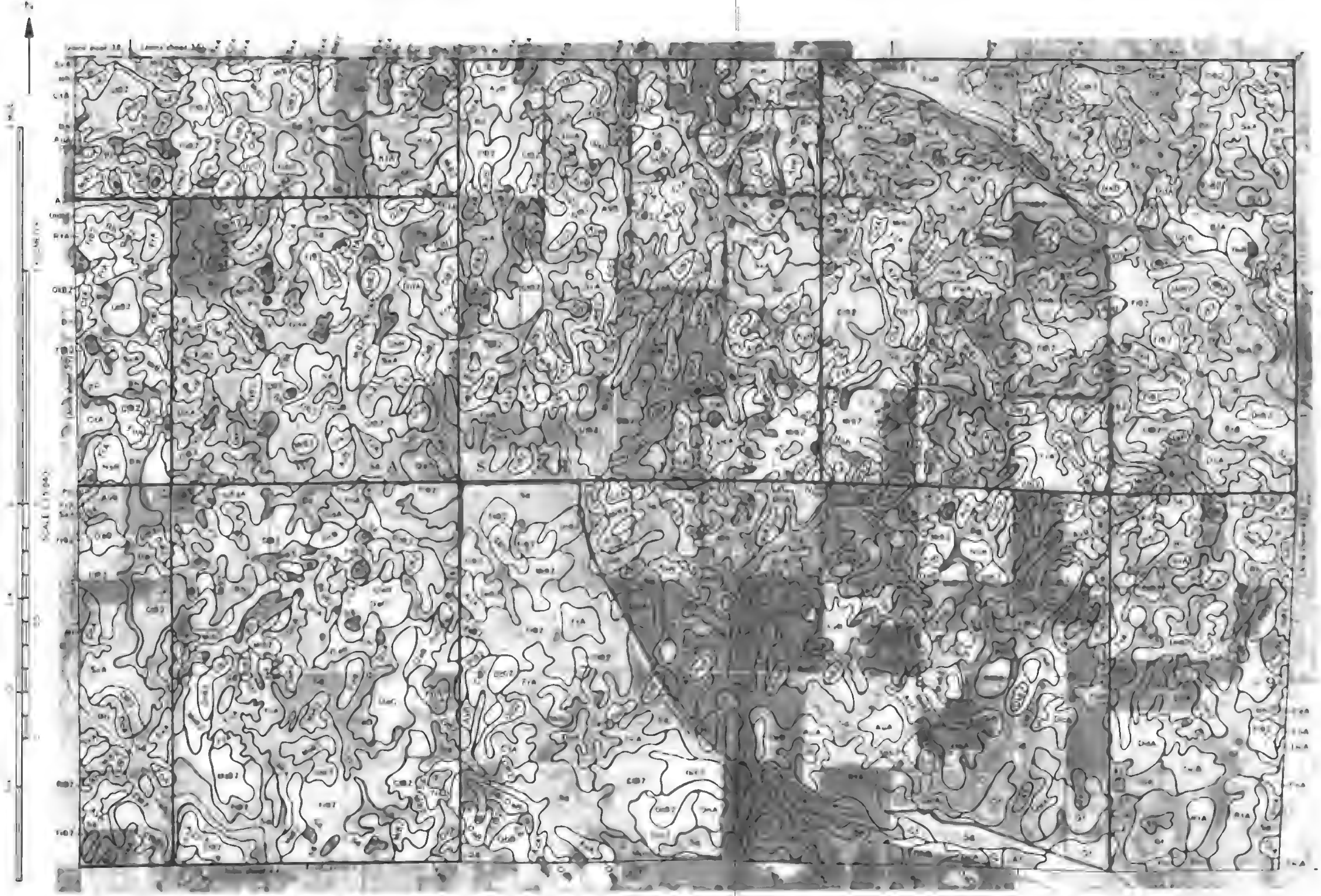
INSET A



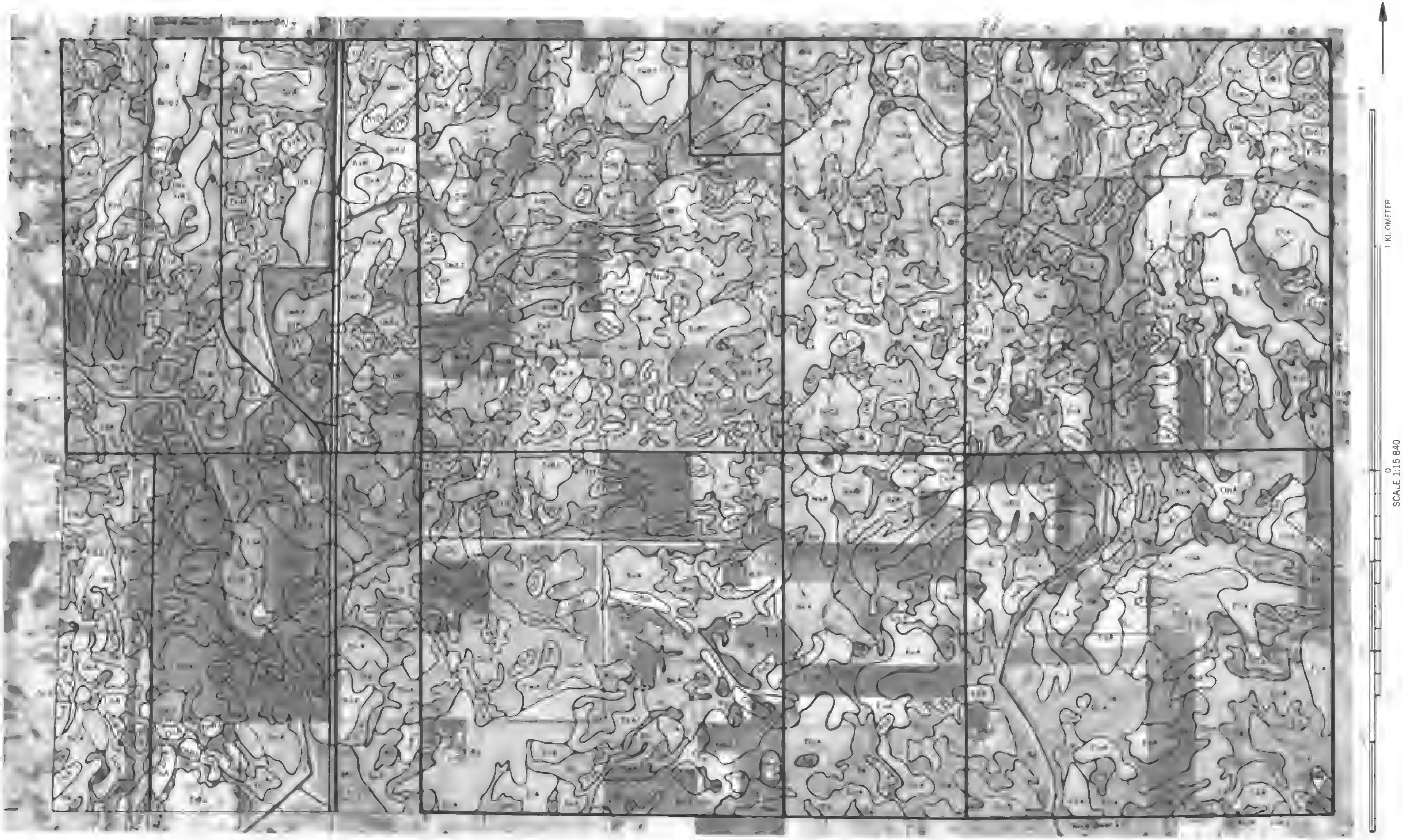
3000 AND 5000-FOOT GRID TICKS



3000 AND 5000-FOOT GRID TICKS



as compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating
om 1982 aerial photography. Coordinate grid ticks and land division corners



agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF NEWTON COUNTY, INDIANA — SHEET NUMBER 42

N

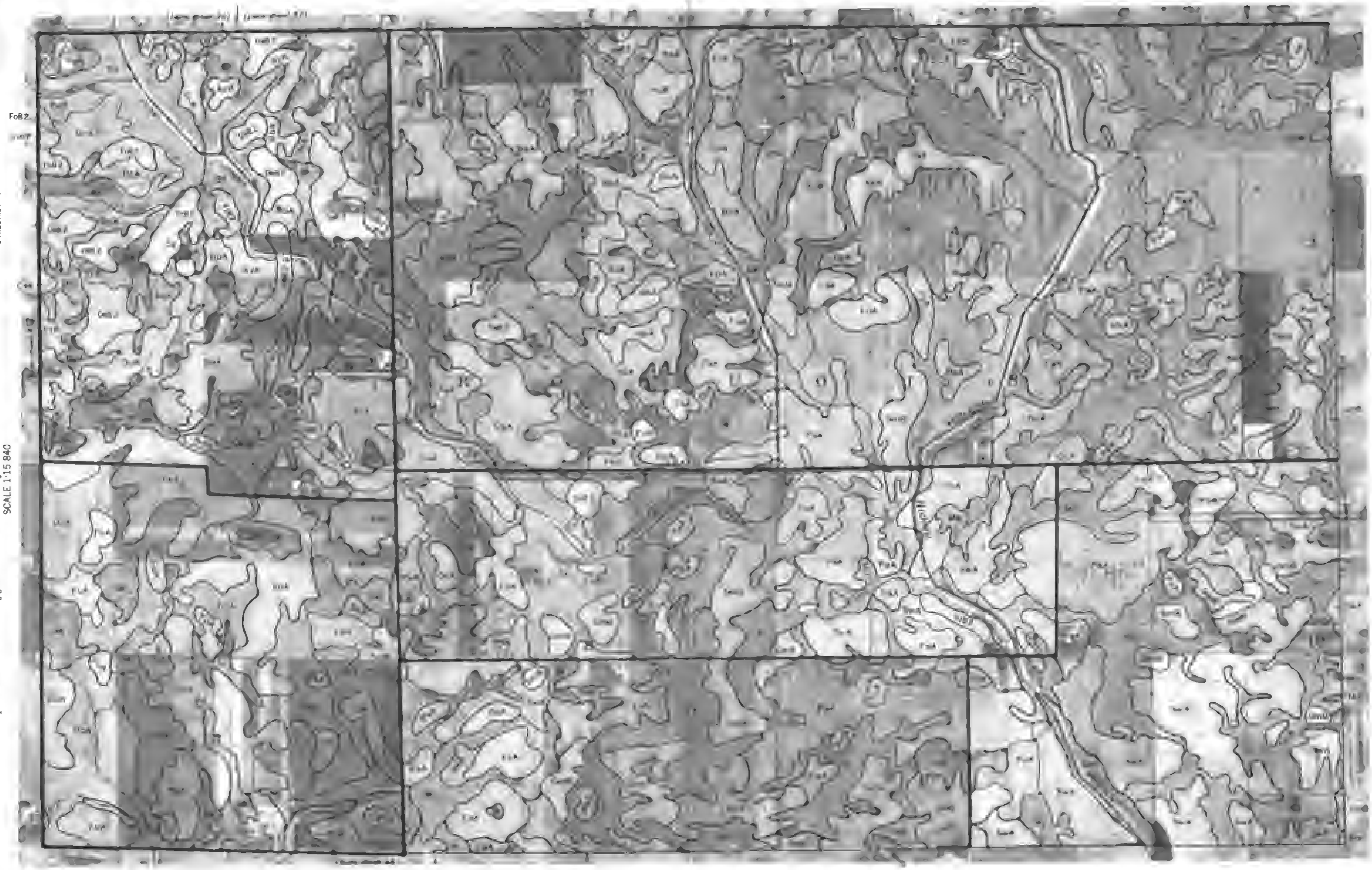
1 MILE

1 KILOMETER

SCALE 1:15 840

0 1/4 1/2 3/4 1

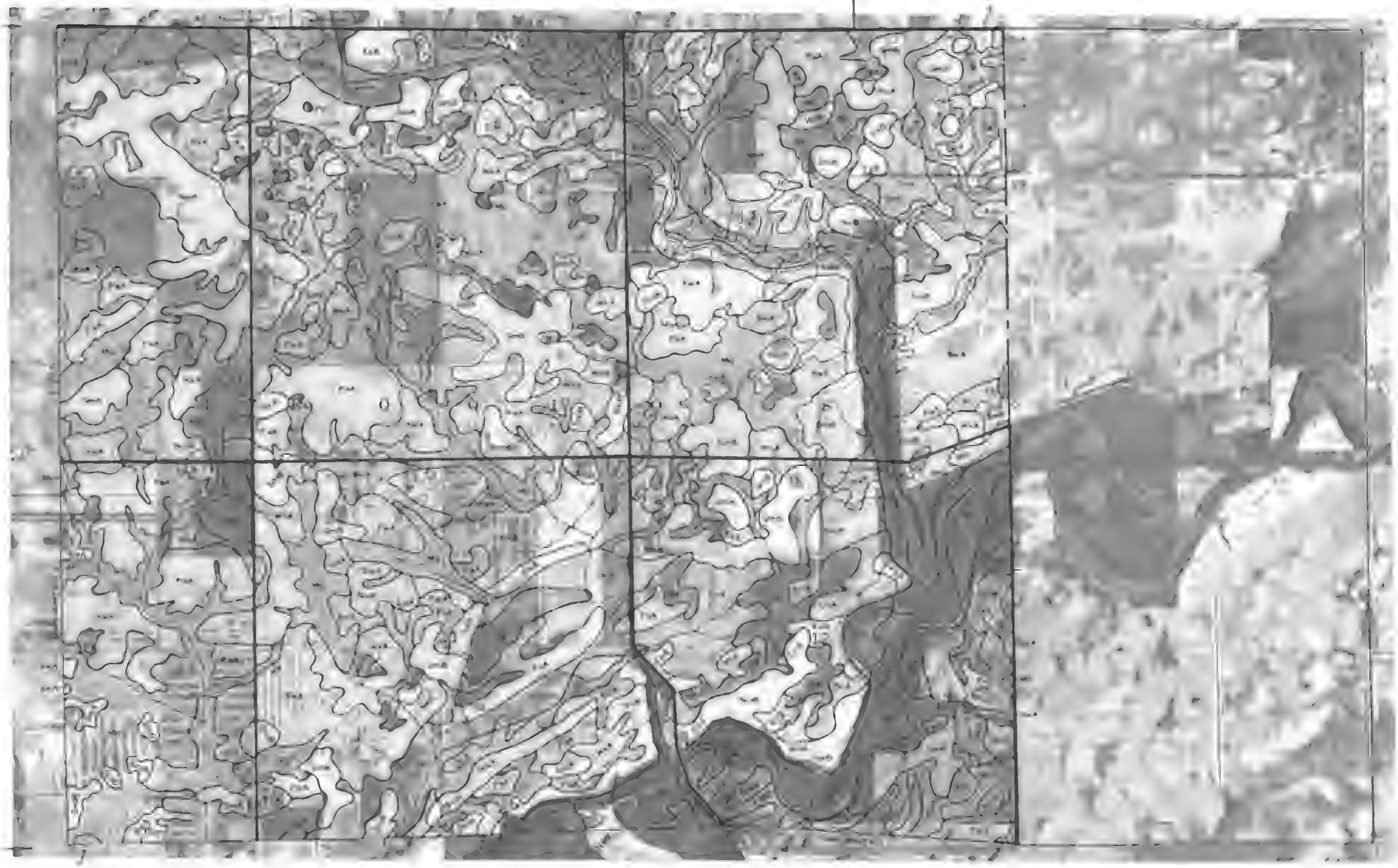
0 0.5 1



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

NEWTON COUNTY, INDIANA NO. 42

SOIL SURVEY OF NEWTON COUNTY, INDIANA — SHEET NUMBER 43



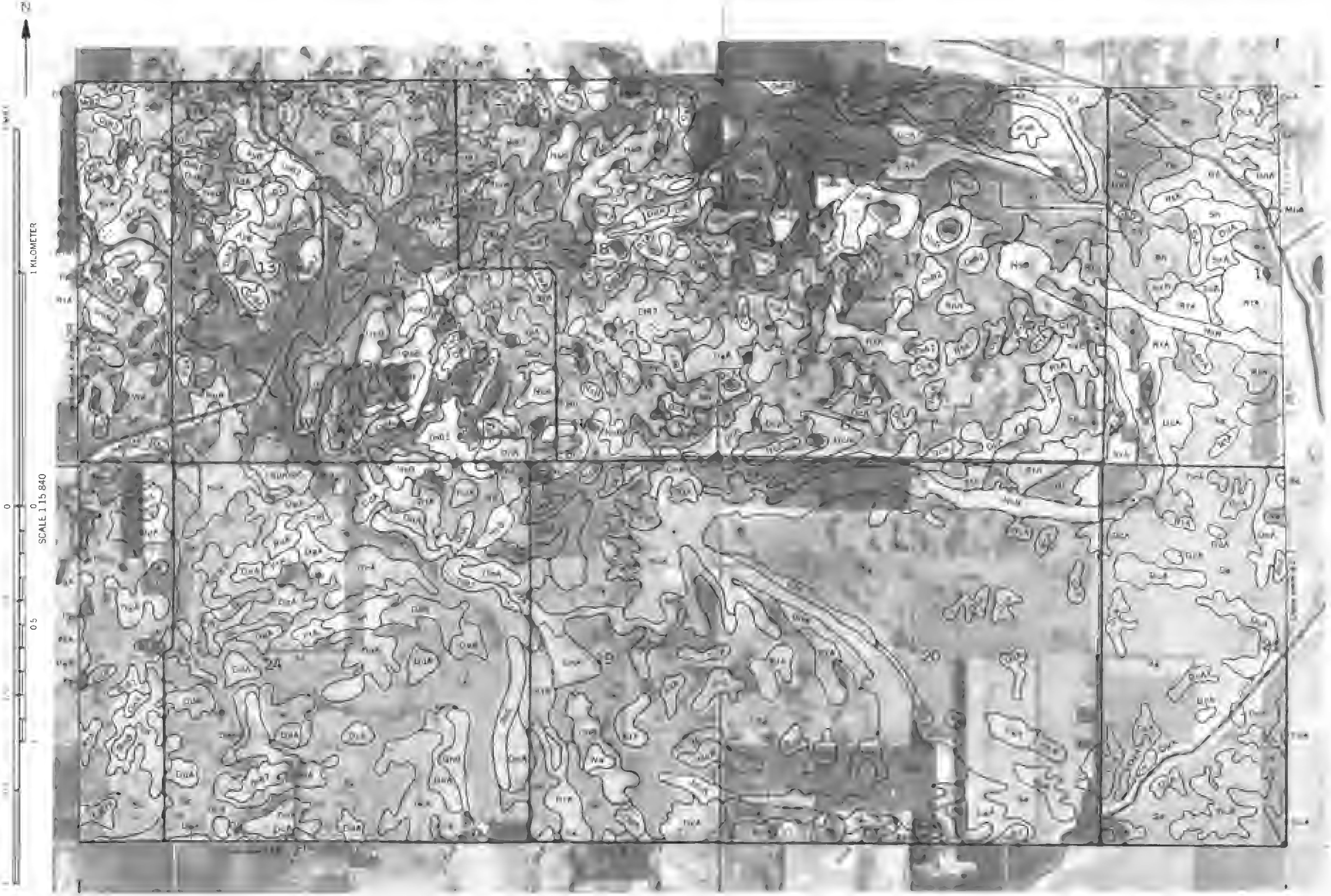
1 KILOMETER

0

SCALE 1:15 840

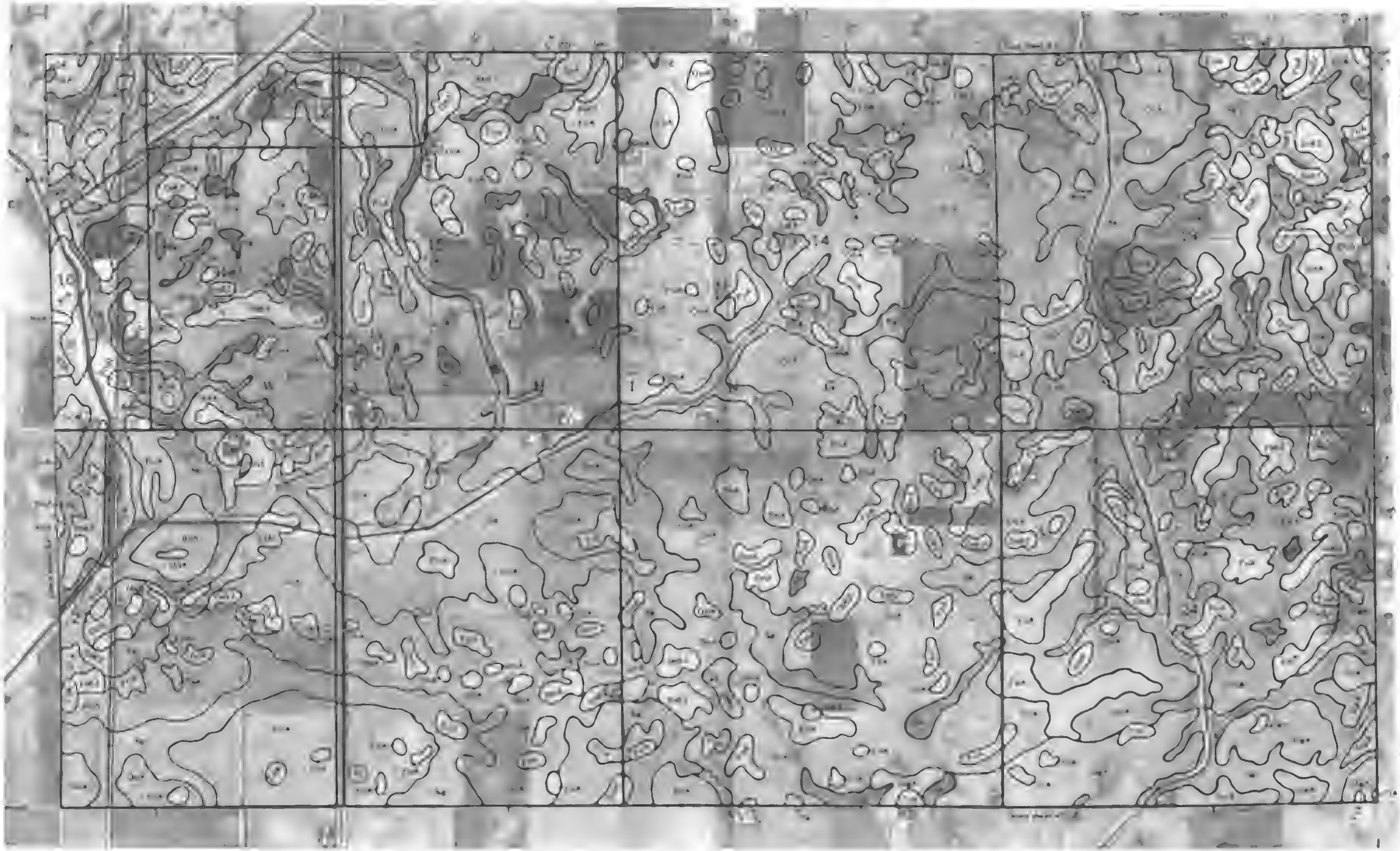
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF NEWTON COUNTY, INDIANA — SHEET NUMBER 44



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and division corners, if shown, are approximately positioned.

NEWTON COUNTY, INDIANA NO. 44



NEWTON COUNTY, INDIANA

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

NEWTON COUNTY, INDIANA NO. 46

1 KILOMETER

0

SCALE 1:15 840

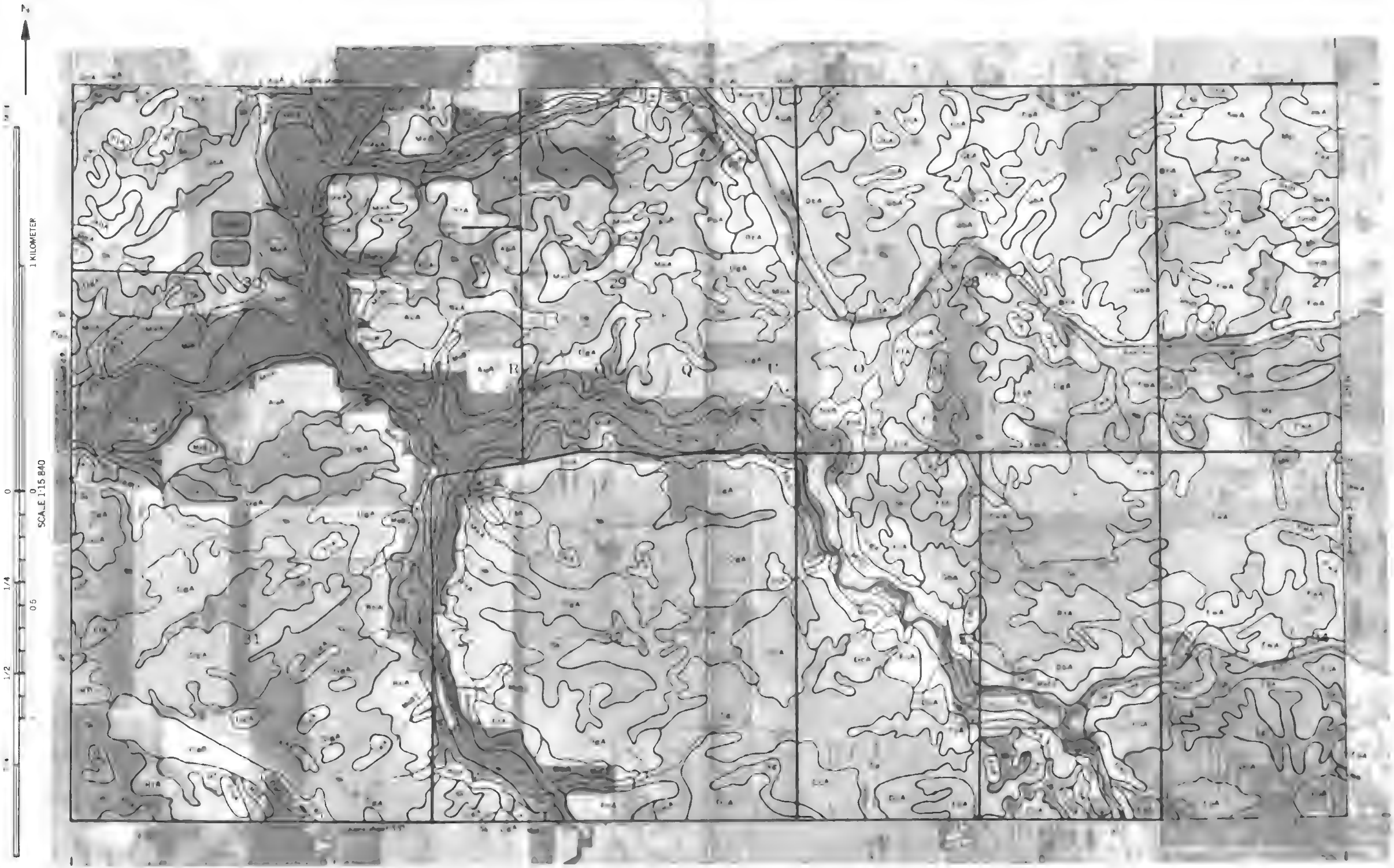
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF NEWTON COUNTY, INDIANA — SHEET NUMBER 48

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

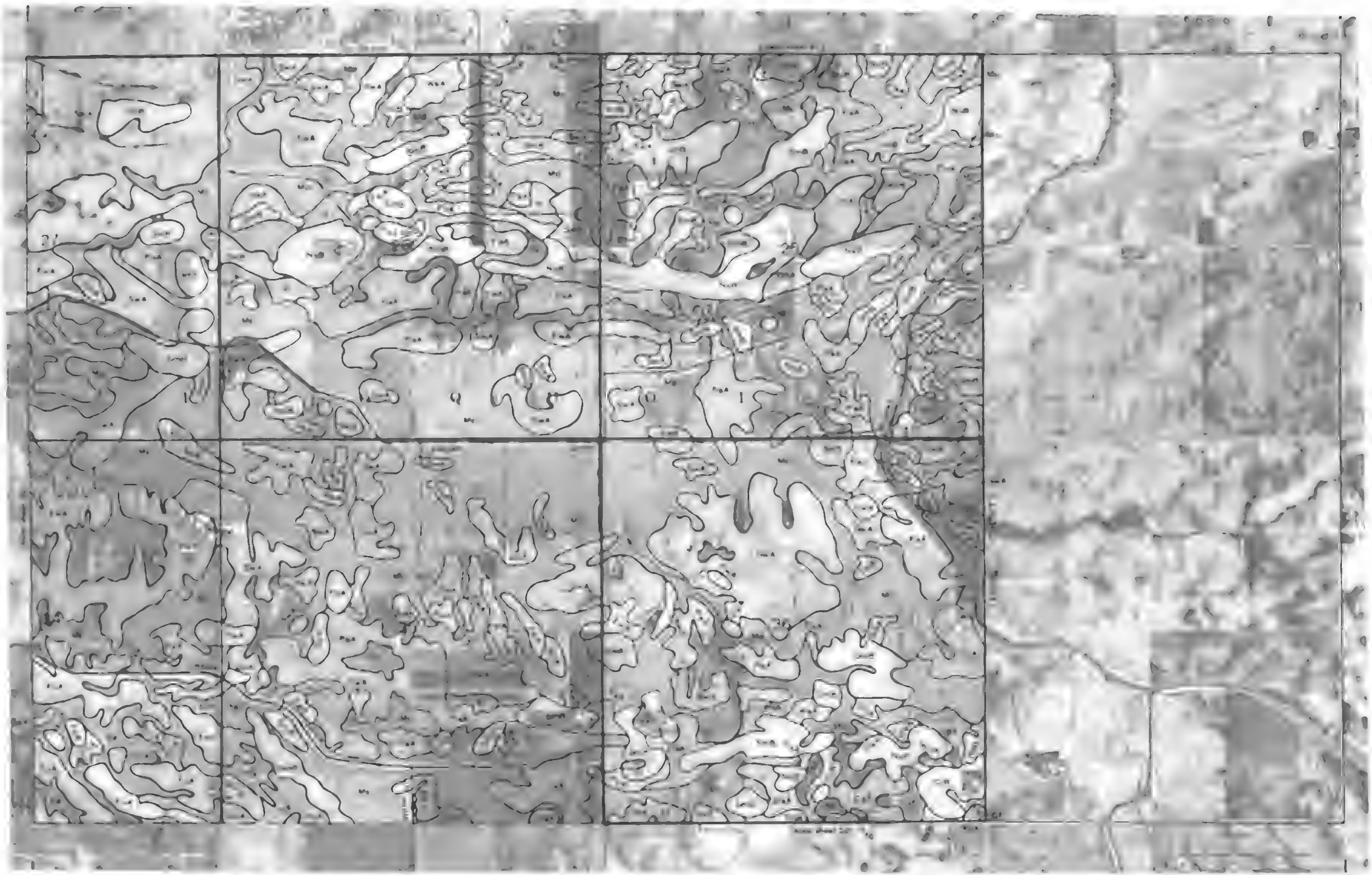
NEWTON COUNTY, INDIANA NO. 49

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

NEWTON COUNTY, INDIANA NO. 50



N

1 KILOMETER

0

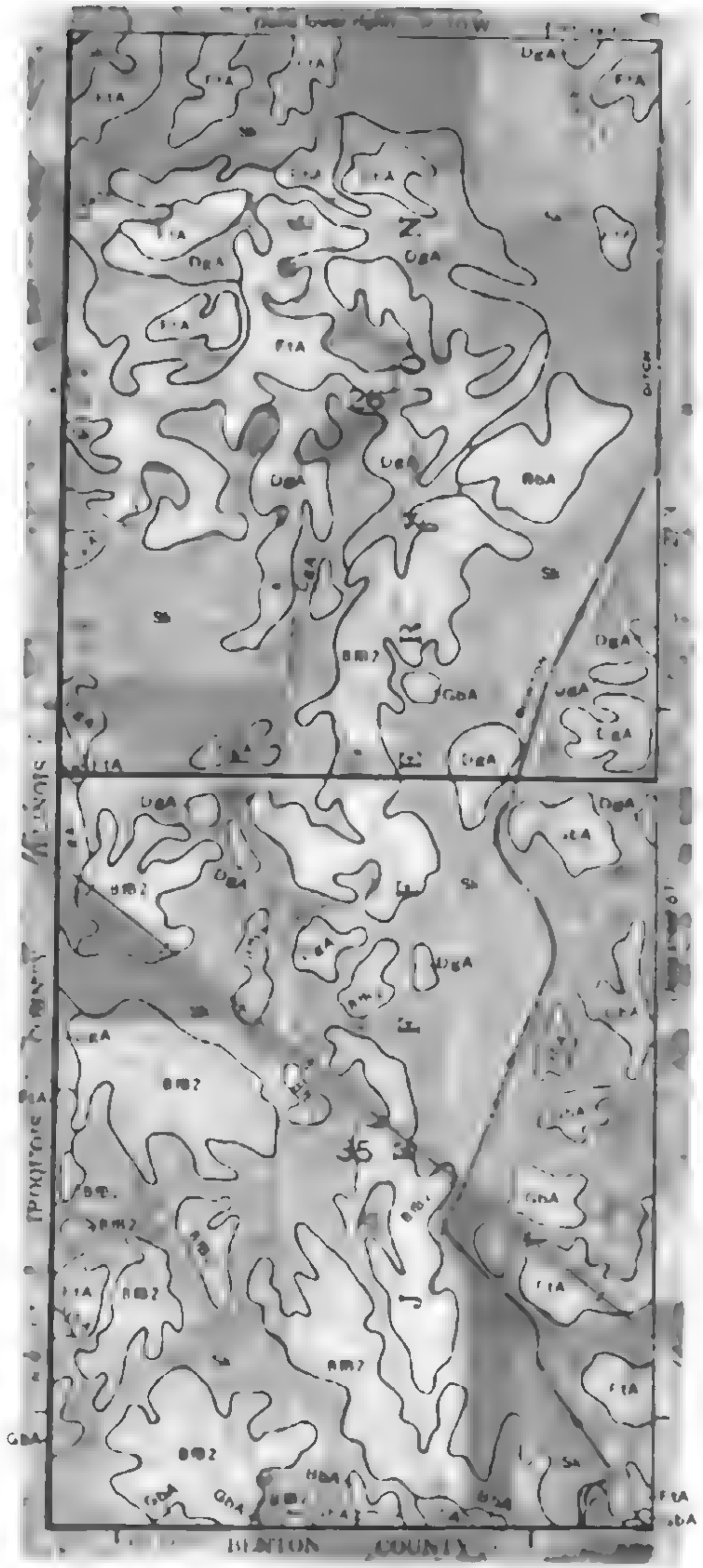
SCALE 1:15 840

NEWTON COUNTY, INDIANA NO. 51

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

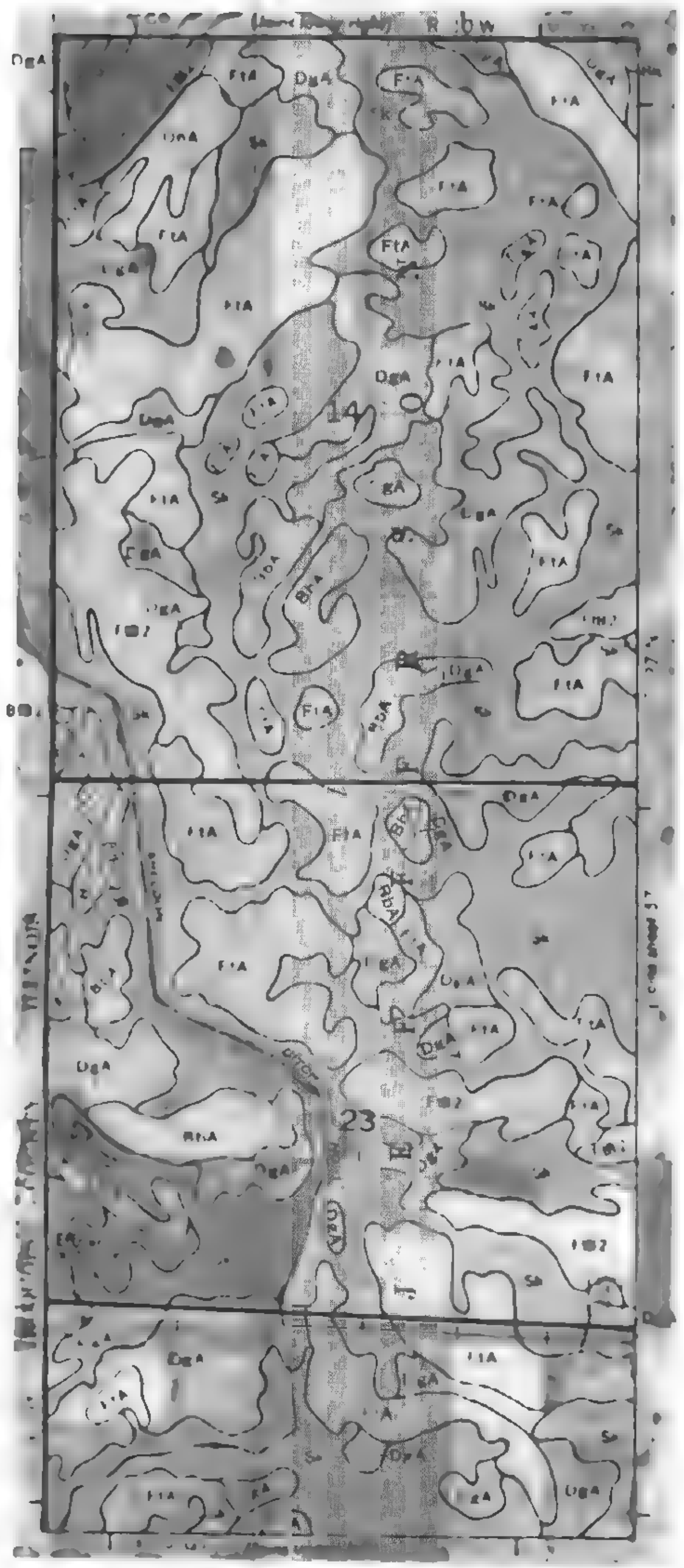
52

INSET B

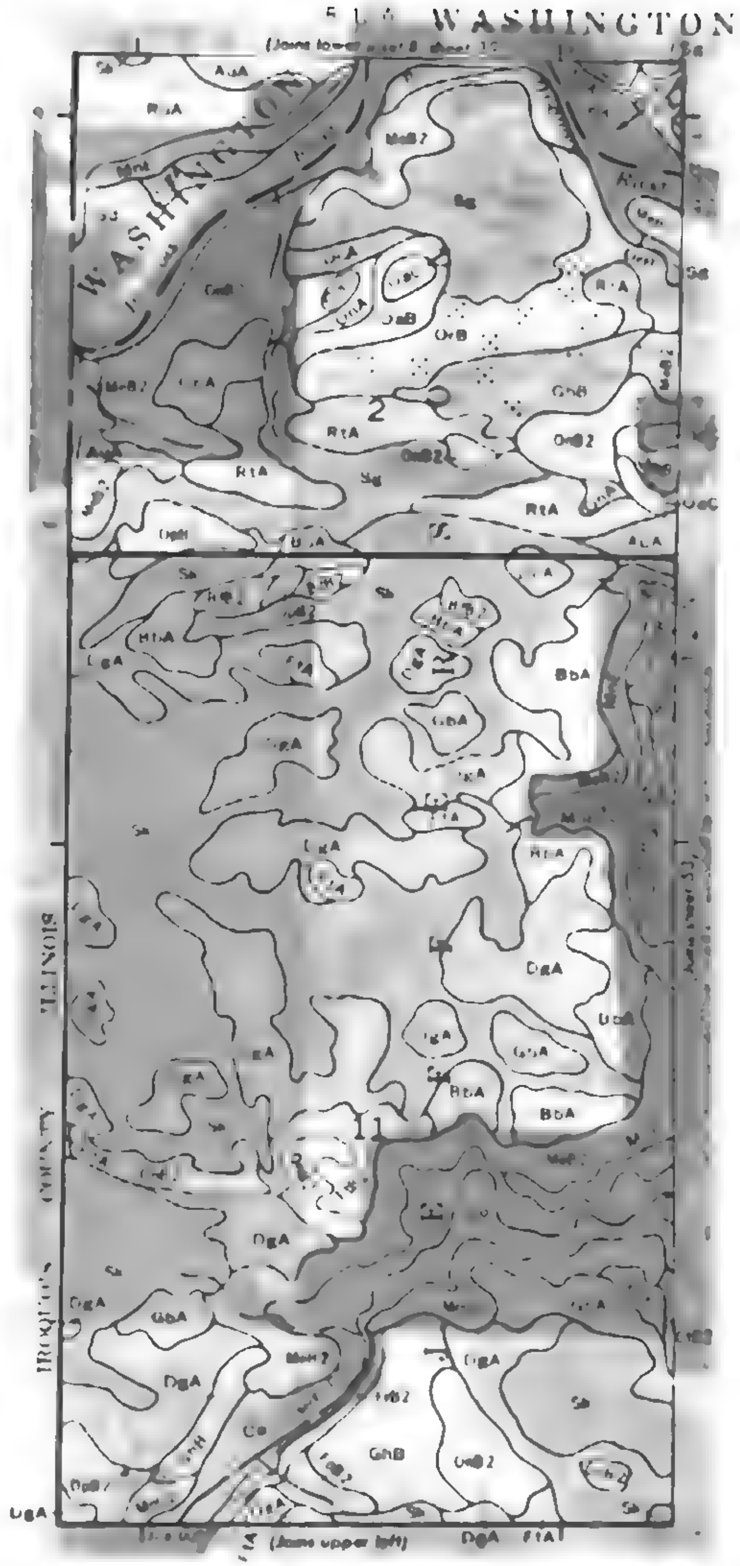


3000 AND 5000 FOOT GRID TICKS

INSET A



3000 AND 5000 FOOT GRID TICKS

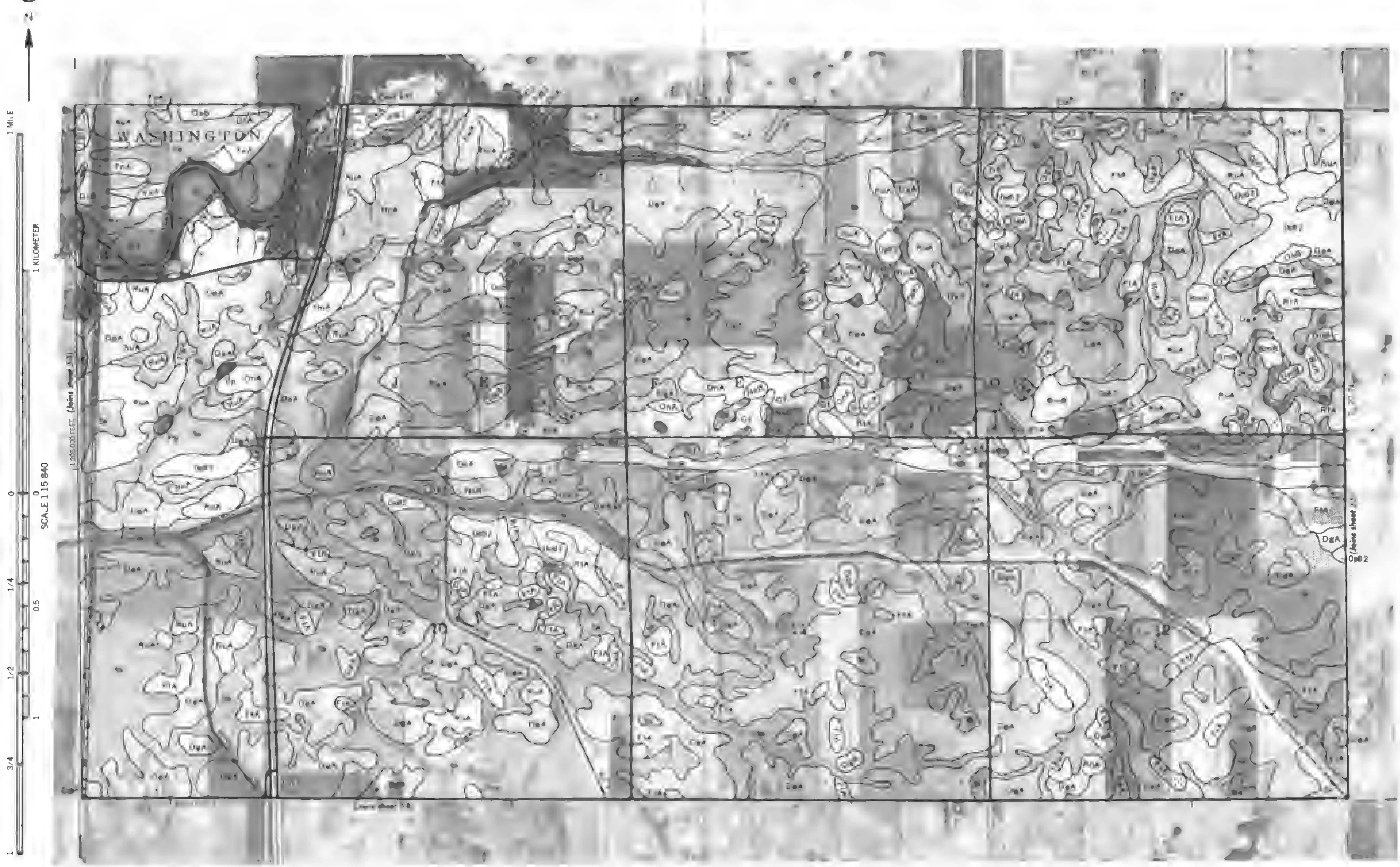


3000 AND 5000 FOOT GRID TICKS

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

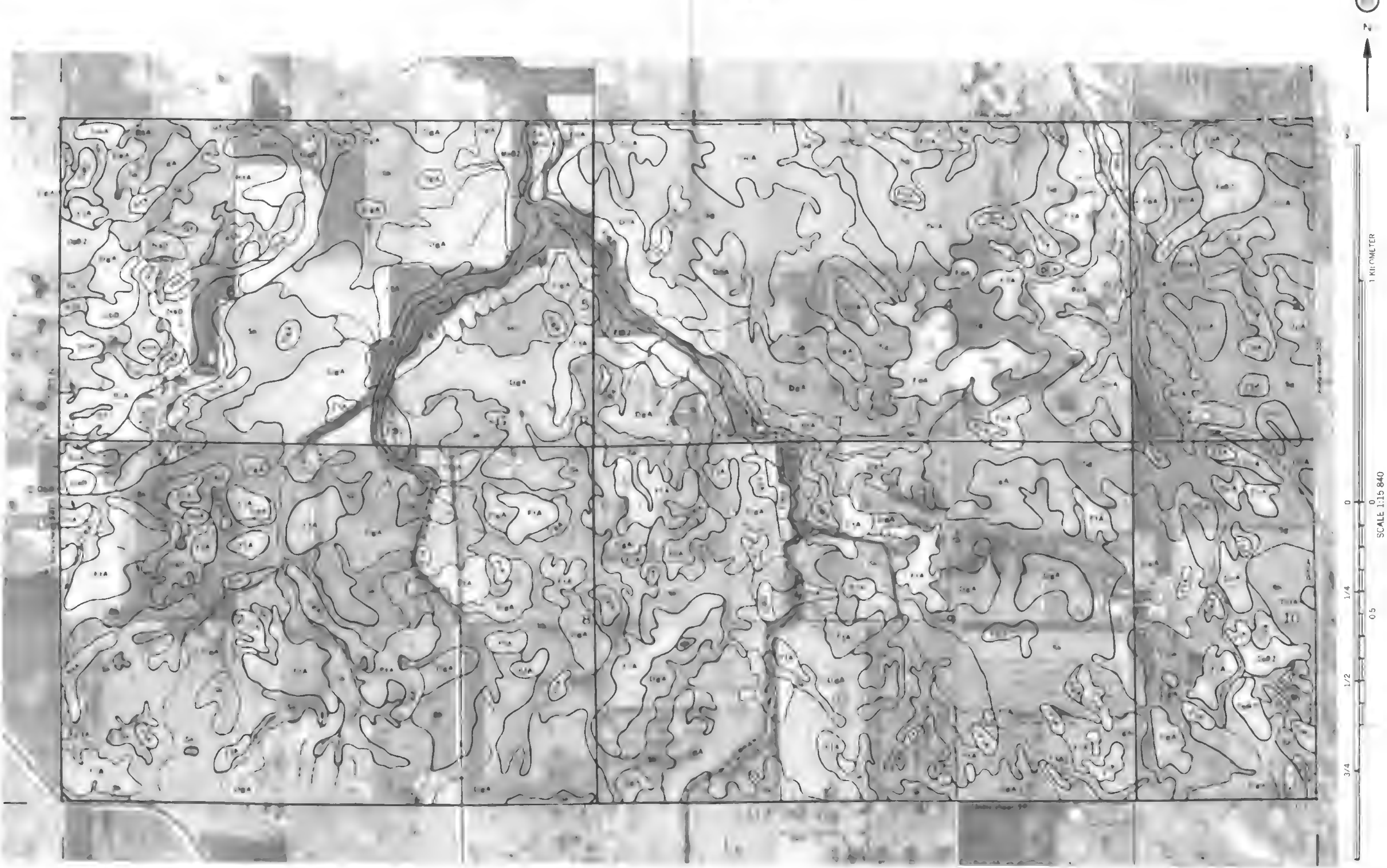
NEWTON COUNTY, INDIANA NO. 53

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



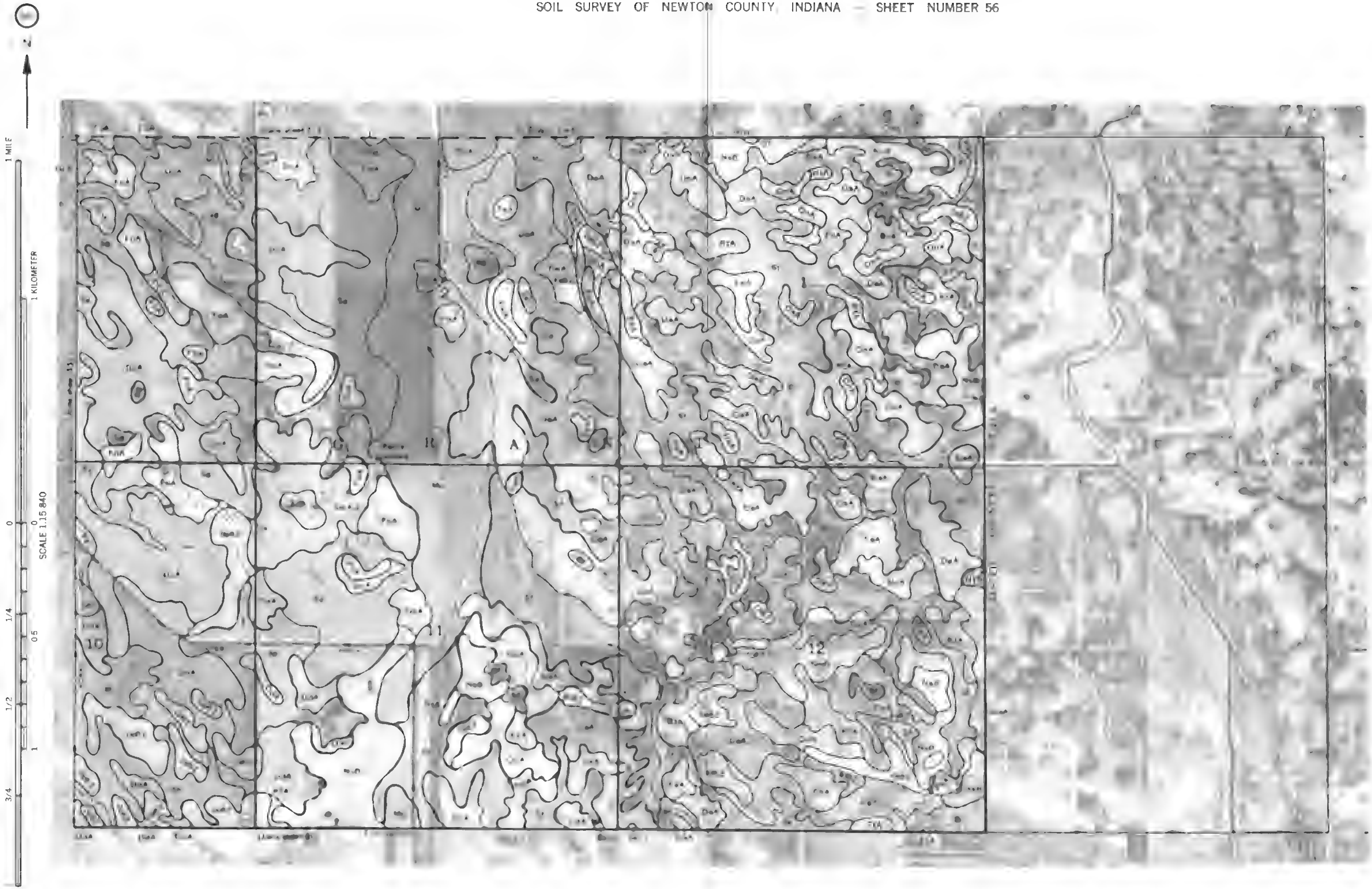
This soil survey map was compiled by the U S Department of Agriculture, Soil Conservation Service and cooperating agencies Base maps are prepared from 1982 aerial photography Coordinate grid ticks and division corners, if shown, are approximately positioned

NEWTON COUNTY, INDIANA NO. 54



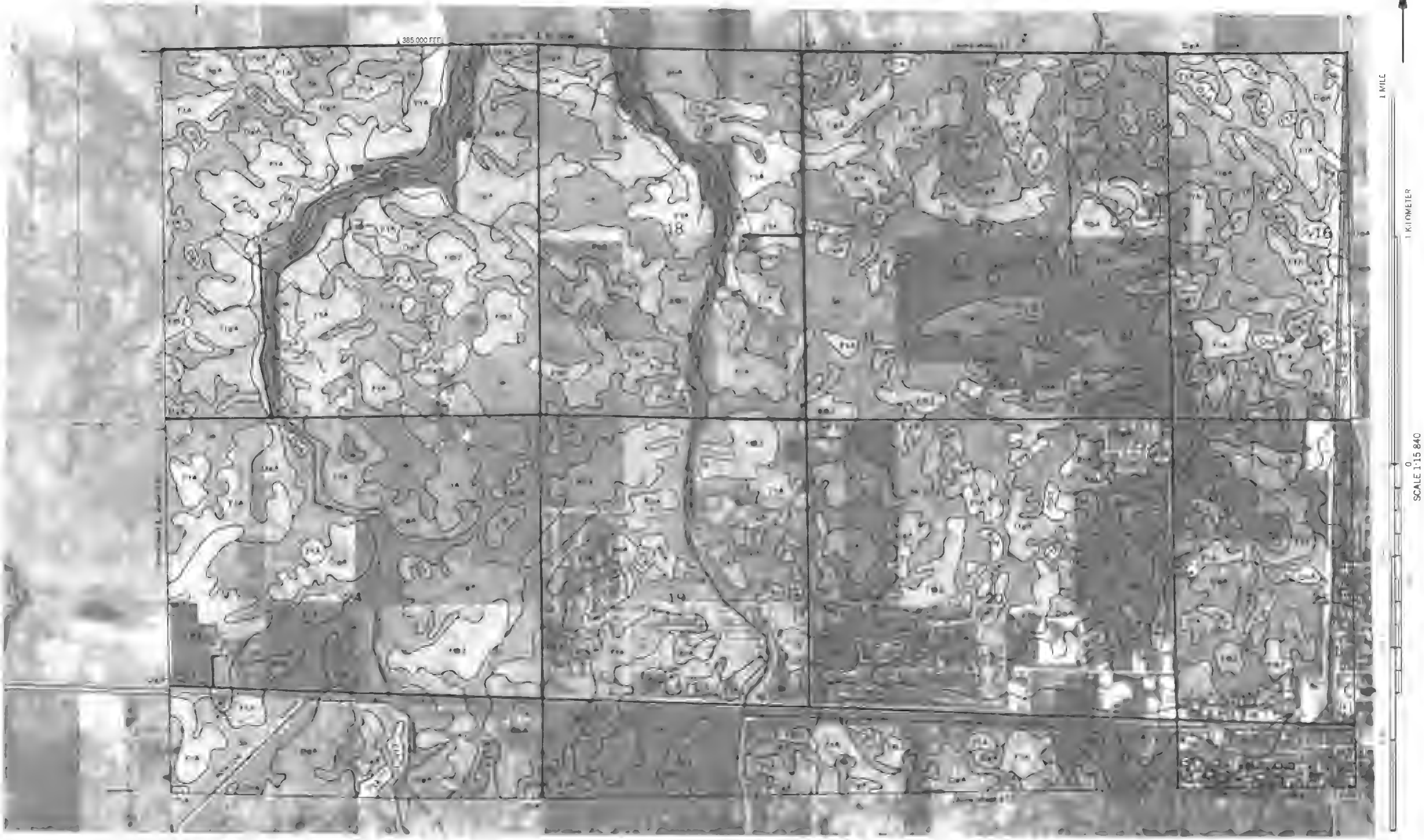
NEWTON COUNTY, INDIANA NO. 55

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

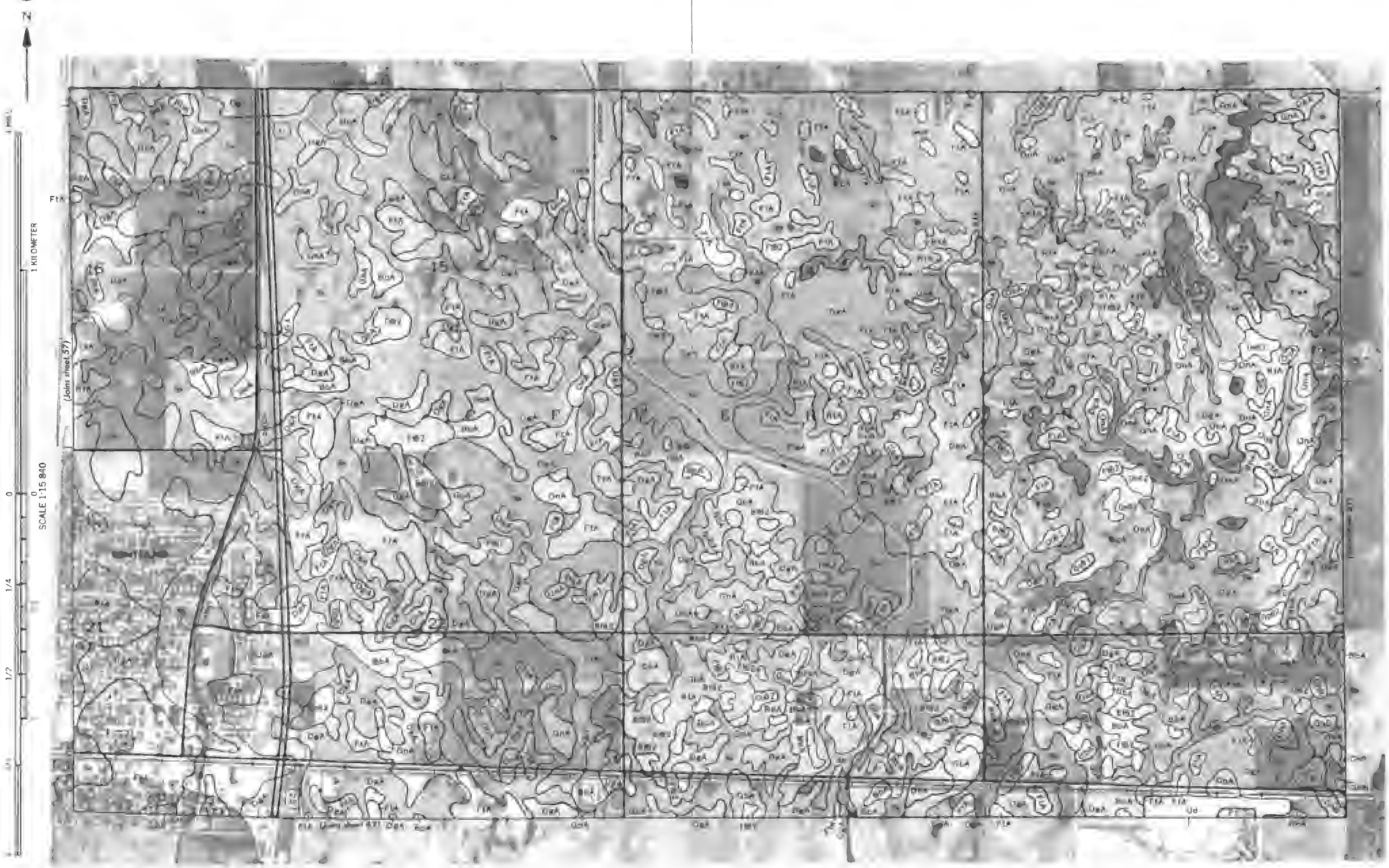


This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

NEWTON COUNTY, INDIANA NO. 56

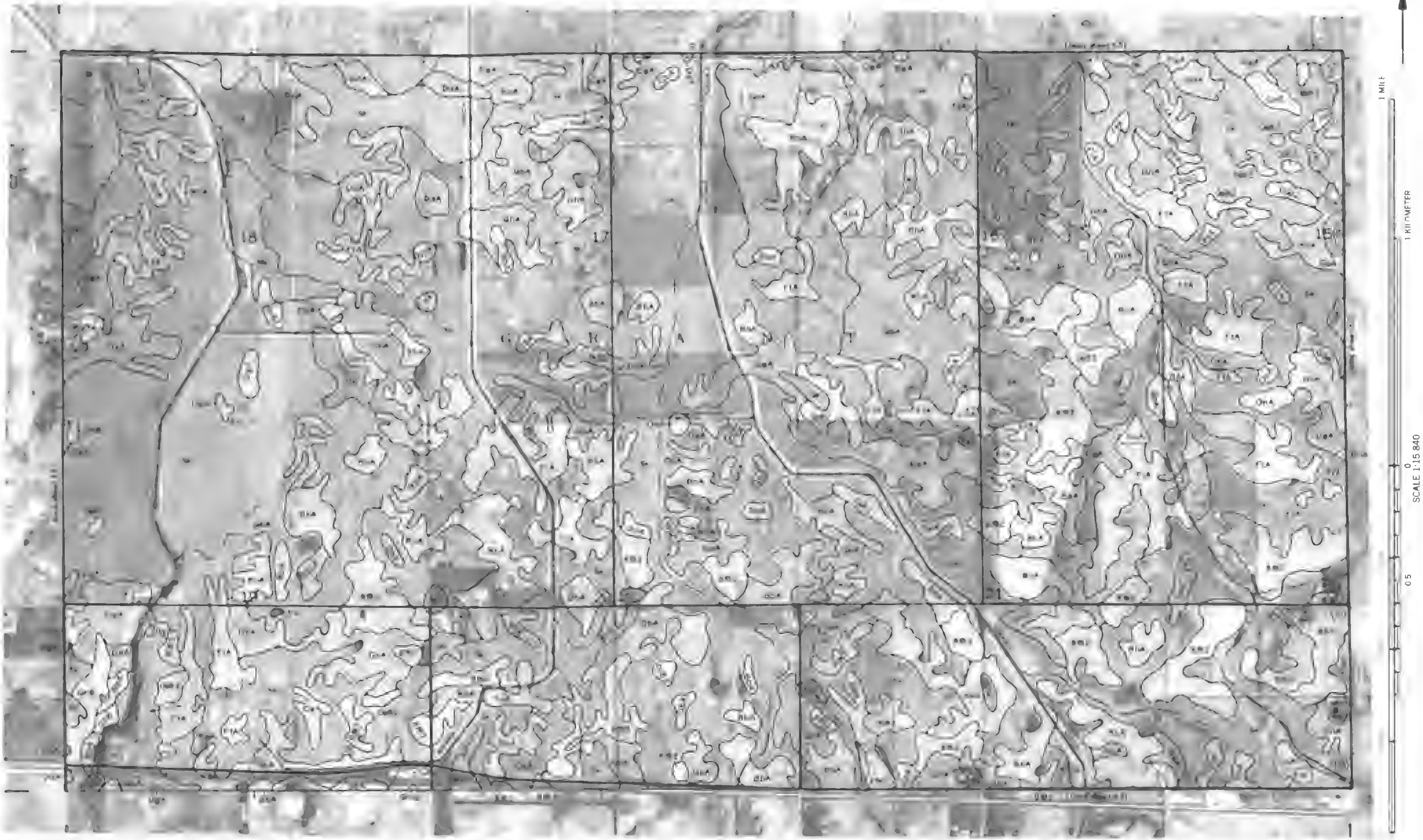


This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

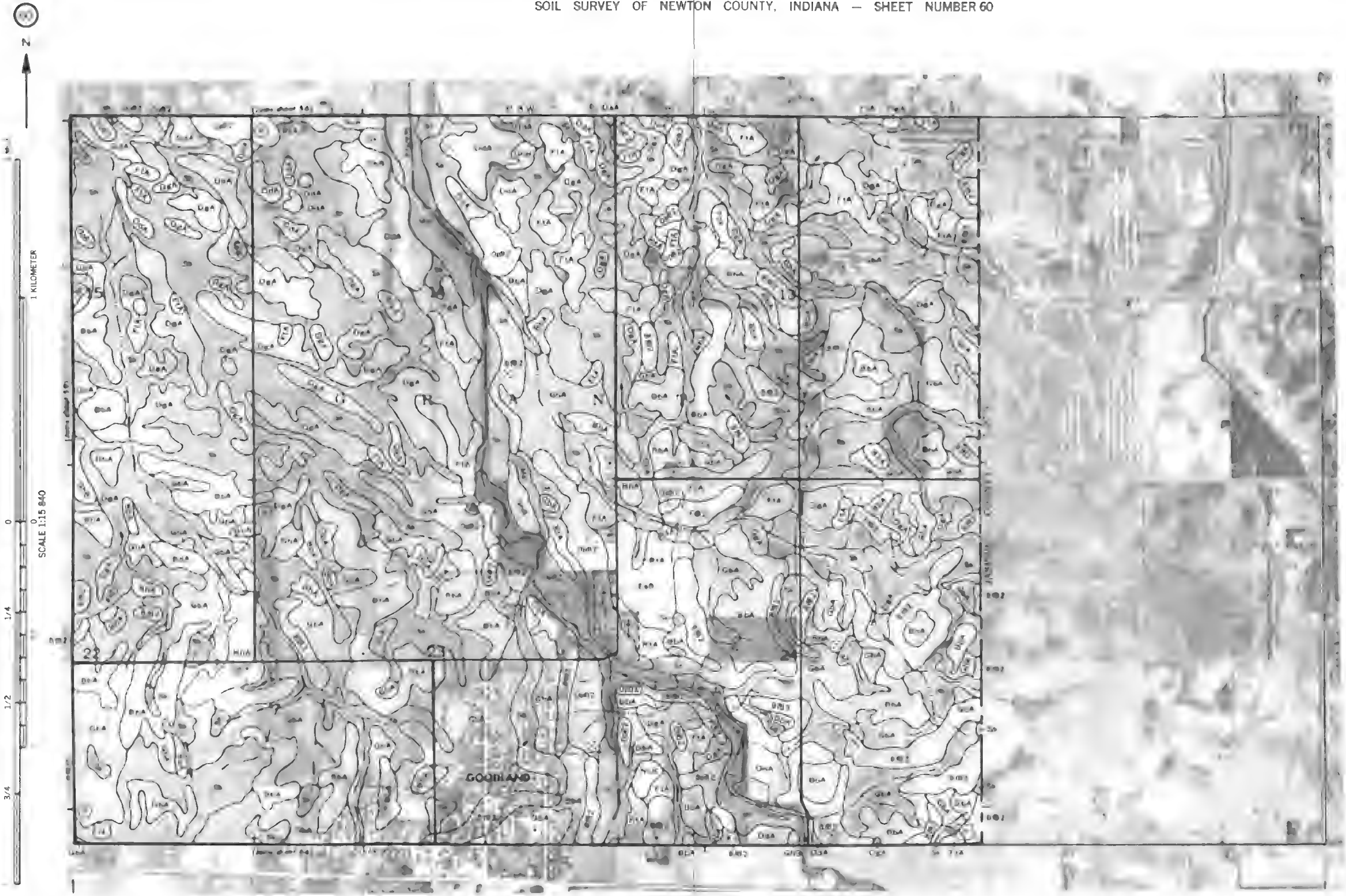


This soil survey map was compiled by the U S Department of Agriculture Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography Coordinate grid ticks and land division corners, if shown, are approximately positioned.

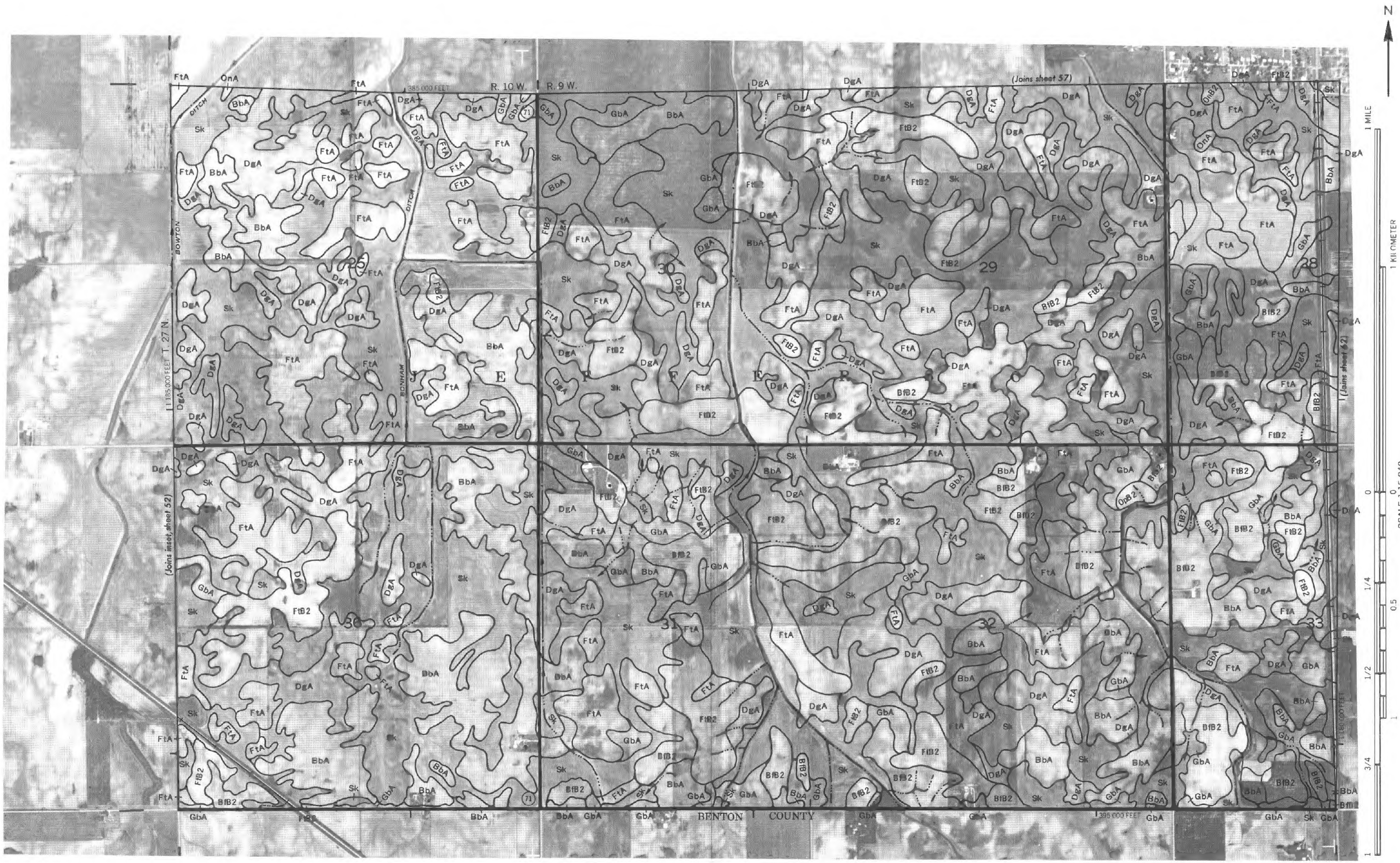
SOIL SURVEY OF NEWTON COUNTY, INDIANA — SHEET NUMBER 59



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



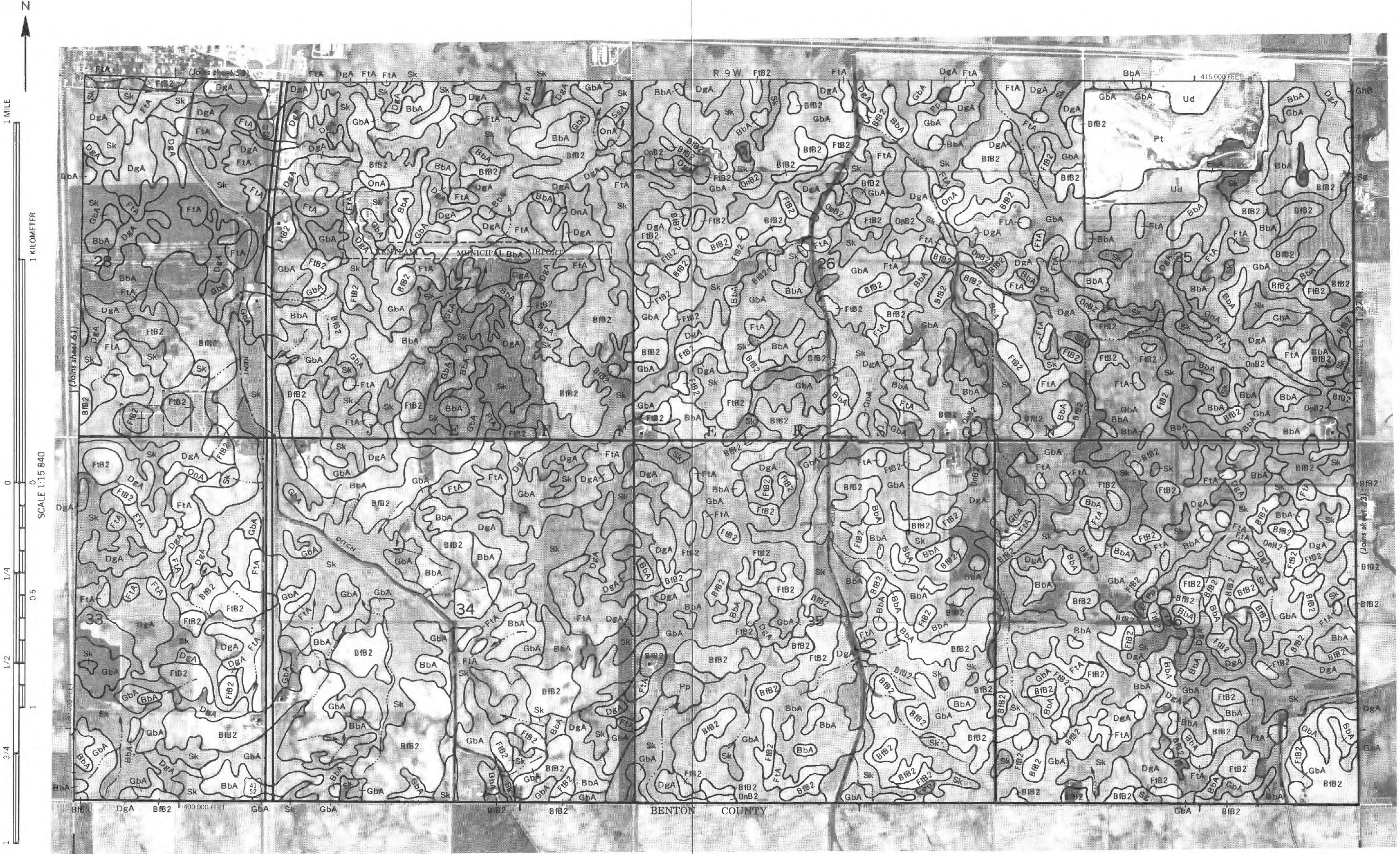
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



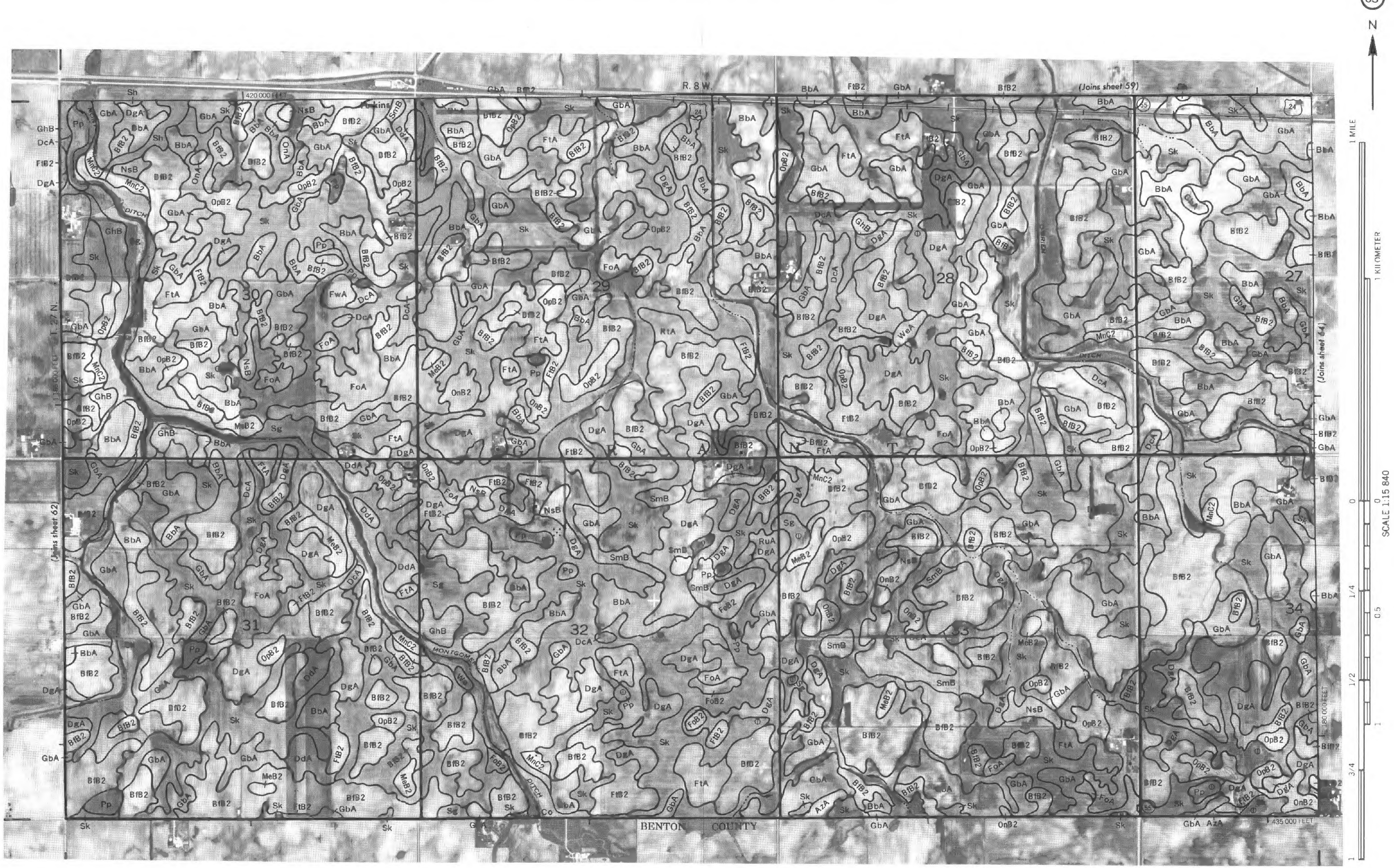
NEWTON COUNTY, INDIANA NO. 61

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF NEWTON COUNTY, INDIANA — SHEET NUMBER 62

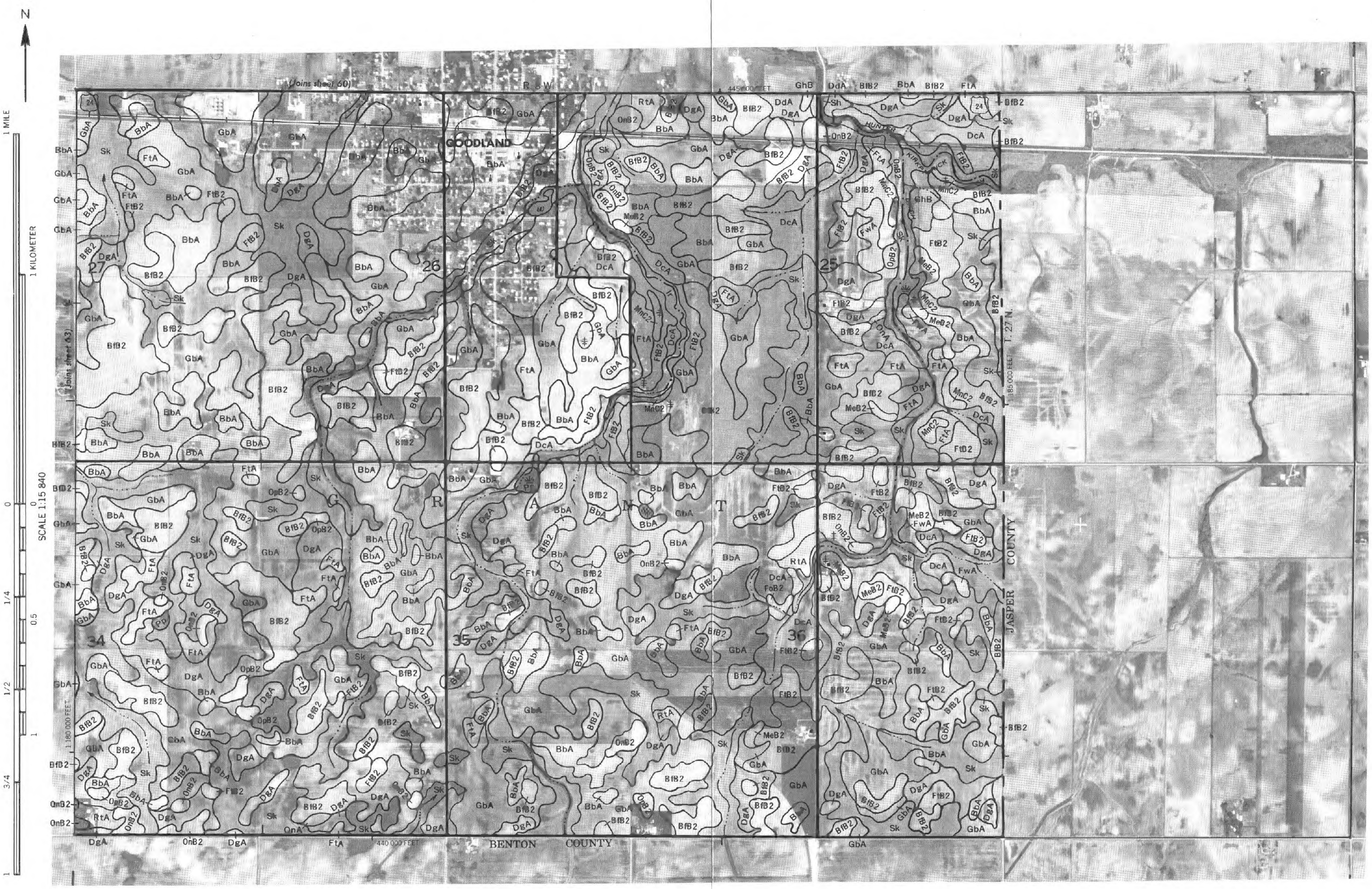


This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF NEWTON COUNTY, INDIANA — SHEET NUMBER 64



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

NEWTON COUNTY, INDIANA NO. 64